JUL 6 1953
CHEMISTRY
LIBRARY

The BULLETIN

American Society of Hospital Pharmacists

conference

ed agents

d States

pharmacist

ration of

ulation

℞

1953

potency considered,

MULTICEBRIN

is the patient's "best buy"
in the quality
multiple-vitamin market

Lilly

'Multicebrin' is *your* "best buy," too, in the new case of fifty 100's at only $146 per case. Your gross profit per case is $97, or 39.9 percent on the selling price. Order a case today from your favorite Lilly wholesaler!

Prices are net trade and subject to change or withdrawal without notice.

GELSEALS

MULTICEBRIN

(Pan-Vitamins, Lilly)

The BULLETIN
American Society of Hospital Pharmacists

MAY-JUNE 1953

VOLUME 10 NUMBER 3

EDITOR

Don E. Francke

University Hospital
University of Michigan
Ann Arbor, Michigan

ASSOCIATE EDITOR

Gloria Niemeyer

American Pharmaceutical Association
2215 Constitution, N. W.
Washington 7, D. C.

CONTRIBUTING EDITORS

Bernard E. Conley
Leo F. Godley
Sister Mary Etheldreda
Eddie Wolfe

ART EDITOR

Richard A. Huff

MEMBERSHIP in the American Society of Hospital Pharmacists and the American Pharmaceutical Association is open to all practicing Hospital Pharmacists. With membership is included subscriptions to THE BULLETIN of the American Society of Hospital Pharmacists and to the two *Journals* of the American Pharmaceutical Association, as well as the several services of both organizations.

ADVERTISING will be accepted, subject to editorial approval, for prescription products as well as for other items used extensively in hospitals. Inquiries should be sent to the Associate Editor of THE BULLETIN, American Pharmaceutical Association, 2215 Constitution Ave., N.W., Washington 7, D. C.

SUBSCRIPTION RATE: In the U.S. $4.50 per year (six issues), single copies 75 cents; Foreign $5 per year, single copies 85 cents. CHANGES OF ADDRESS should be directed to the Division of Hospital Pharmacy, American Pharmaceutical Association, 2215 Constitution Ave. N.W., Washington 7, D. C.

Copyright 1953 by the American Society of Hospital Pharmacists

The American Society of Hospital Pharmacists, an affiliate of the American Pharmaceutical Association, is a national organization devoted to the profession of hospital pharmacy and dedicated to the improvement of pharmaceutical service in the interest of better patient care in hospitals.

IN THIS ISSUE

Barbiturate Intoxication 192
A Staff Conference

Comparisons Between Phisohex, Actamer and Septisol as Germicidal Agents for the Skin 199
S. H. Hopper, A. V. R. Beck and K. M. Wood

P.C.M.X. 202
S. H. Hopper

Pharmacy and Hospital Expansion 204
John W. Cronin

Pyrogens and the Hospital Pharmacist 208
W. Howard Hassler, Treva Chumley, Harold Tracy and Barbara Vance

Considerations in the Preparation of Parenteral Solutions 210
Frank L. Larsen

The Succinates: Their Use and Formulation 220
Jerome M. Yalon

Public Health Service Reports on Survey 223

ASHP Meets with APhA, Salt Lake City, August 16-21 224

Interns in Hospital Pharmacy 227

Affiliated Chapters 237
As the President Sees It 240
Current Literature 233
Editorial 191
Letters 189
New Members 246
News Items 241
Notes and Suggestions 235
Positions 248
Therapeutic Trends 228
Timely Drugs 230
Veterans Administration 234

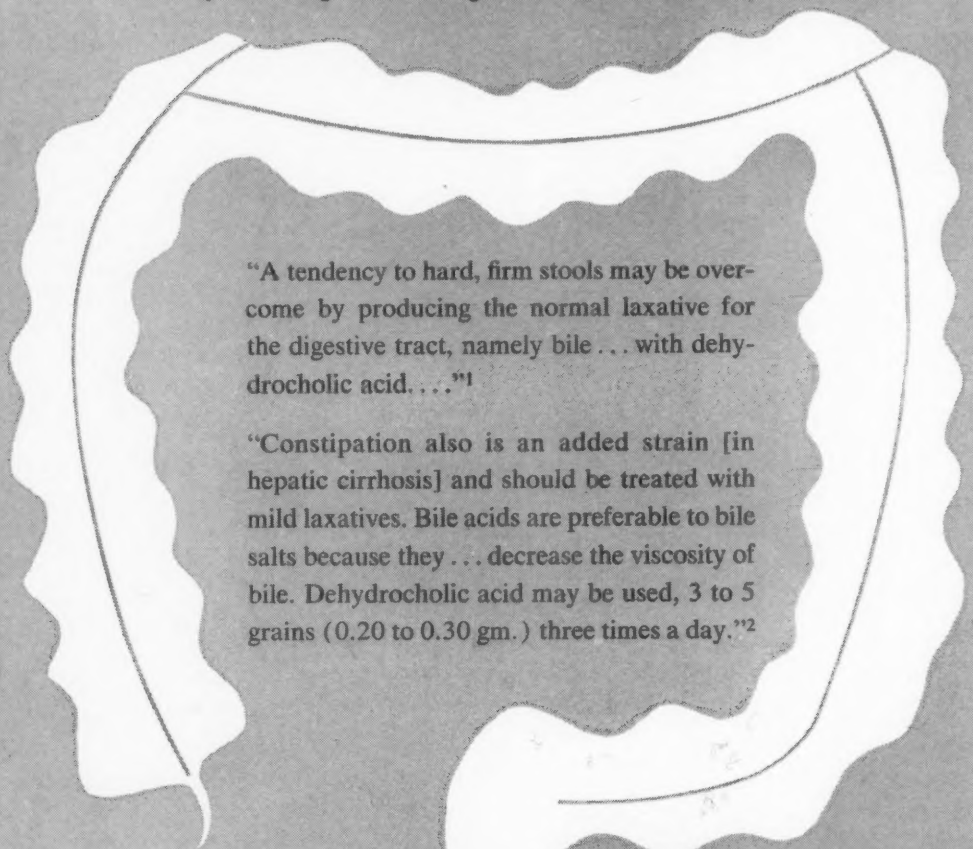
THE BULLETIN is published bimonthly at Hamilton, Illinois, by the American Society of Hospital Pharmacists in cooperation with the Division of Hospital Pharmacy of the American Pharmaceutical Association. Editorial office at 1313 East Ann Street, Ann Arbor, Michigan. Entered as second class matter July 19, 1951 at the post office at Hamilton, Illinois. CONTRIBUTIONS will be accepted if they are of general interest to those in hospital pharmacy. The editors reserve the right to revise all material submitted, if necessary. The American Society of Hospital Pharmacists and the American Pharmaceutical Association assume no responsibility for the statements and opinions advanced by contributors to THE BULLETIN. Views expressed in the editorials are those of the editor and do not necessarily represent the official position of either the American Society of Hospital Pharmacists or the American Pharmaceutical Association.

DECHOLIN®

normalizes intestinal function

in elderly, constipated patients

A recent study[1] reports constipation in 50 per cent of 133 patients over 60 years of age. Discussing treatment, the authors note that:



"A tendency to hard, firm stools may be overcome by producing the normal laxative for the digestive tract, namely bile . . . with dehydrocholic acid. . . ."[1]

"Constipation also is an added strain [in hepatic cirrhosis] and should be treated with mild laxatives. Bile acids are preferable to bile salts because they . . . decrease the viscosity of bile. Dehydrocholic acid may be used, 3 to 5 grains (0.20 to 0.30 gm.) three times a day."[2]

Decholin Tablets
(dehydrocholic acid, AMES),
3¾ gr. (0.25 Gm.), bottles
of 100, 500, 1000 and 5000.

1. Portis, S. A., and King, J. C.: J.A.M.A. *148*:1073, 1952.
2. Portis, S. A., and Weinberg, S.: J.A.M.A. *149*:1265, 1952.

AMES

COMPANY, INC • ELKHART, INDIANA

Ames Company of Canada, Ltd., Toronto

LETTERS

From Sweden

DEAR SIRS: . . . I wish to thank you, and through you, all American hospital pharmacists, who showed me such wonderful hospitality and comradeship during a wonderful week in Philadelphia last fall. I was very much impressed by everything I saw of your work in hospital pharmacy and think your SOCIETY has done a fine job during the ten years it has been in existence. I especially envy you of THE BULLETIN and the Decennial issue.

BORJE ALM, *chief pharmacist*
Swedish Defense Forces

Militarapoteket
Stockholm, Sweden

List of Stock Drugs

DEAR SIRS: I have read a summary of the article, "Coordination of Nursing and Pharmacy Departments," written by Dorothy M. Morgan, University of Chicago Clinics, which appeared in the November-December issue of THE BULLETIN. Miss Morgan made reference to a list of stock drugs which has been compiled. I wonder if you could send us a copy of the list, together with other information you have that would be of help to hospital pharmacies. Thank you for your courtesy and attention.

CHAS. S. BILLING, *executive secretary*
The Kansas Hospital Assoc.
Topeka, Kans.

From Alaska

DEAR SIRS: Thank you very much for your prompt attention to my request for copies of hospital formularies. They were returned via Air Parcel Post several days ago and I am enclosing a check covering the cost of mailing from Washington.

The formularies helped a great deal and gave me an idea of how to go about organizing one. I did not have very much time to work on this project as besides organizing the pharmacy, I am also personnel director and there is a great turnover of employees in the Territory. The doctors are very cooperative and are interested in the formulary and are happy to have an up-to-date pharmacy. . . .

SISTER STANISLAUS, *pharmacist*
Saint Joseph's Hospital
Fairbanks, Alaska

Appreciates Bulletin

DEAR SIRS: Please change my address to . . . I do not want to miss one issue of your fine publication.

SISTER M. LIGOURI, R.S.M., *pharmacist*
Mercy Hospital
Manistee, Mich.

DEAR SIRS: May I compliment you on your fine journal. It has been an excellent textbook for a pharmacist new to the field. I am wondering if a monthly publication has been considered? I am sure that the membership would welcome it, even with the additional cost it would entail.

I have copies of THE BULLETIN starting with Volume 7. Are there copies prior to this available? Please advise, as I would like to have as complete a file as possible.

CHAUNCEY C. ADAMS, *pharmacist*
U. S. Naval Hospital
Jacksonville, Fla.

EDITOR'S NOTE: The following complete volumes of THE BULLETIN are available: Volume 1 (1943-1944), $3.00. Volumes 7 (1950), 8 (1951), and 9 (1952) at $4.50 each or 75c for a single copy. Some numbers of the other volumes are still available. Inquiries may be sent to: THE BULLETIN OF THE ASHP, 2215 Constitution Ave., N.W., Washington, D. C.

DEAR SIRS: This is to let you know how much I enjoyed reading the International Number of THE BULLETIN . . . In its textual part and in its style it is simply marvelous . . .

GEORGE URDANG, *director*
American Institute of the History of Pharmacy
Madison, Wis.

7:45 A.M. Room A Suprapubic

8:00 A.M. Ampitheatre Cholecyste

8:00 A.M. Room B Thyroidect

8:15 A.M. Room C Radical Ma

8:45 A.M. Room A2 Submucous

9:30 A.M. Ampitheatre Resection

useful throughout the operative schedule

Thrombin Topical

THROMBIN TOPICAL acts directly on the blood fibrinogen to form a firm, adherent, *natural* clot, producing hemostasis in a matter of seconds. Whether you spray, flood or dust it onto affected surfaces, THROMBIN TOPICAL helps control capillary bleeding in abdominal surgery, brain and bone surgery, skin grafting, nose and throat operations, prostatic surgery, dental extraction, bleeding incident to drainage, excision or debridement, and many other operative procedures.

THROMBIN TOPICAL (bovine origin) is supplied in vials containing 5000 N.I.H. units each, with one 5-cc. vial of sterile isotonic saline diluent. Also available in a package containing three vials of THROMBIN TOPICAL (1000 N.I.H. units each) and one 6-cc. vial of diluent.

THROMBIN TOPICAL should never be injected. It is intended for topical use only.

MEDICAMENTA VERA · PD & CO.

Parke, Davis & Company

DETROIT, MICHIGAN

EDITORIAL

The Role of Literature in Hospital Pharmacy

by GLORIA NIEMEYER, *Associate Editor*

With this issue of THE BULLETIN ten years have elapsed since the first national publication for hospital pharmacists appeared in the United States. Number 1 of Volume 1, then known as *The Official Bulletin of The American Society of Hospital Pharmacists* is dated June, 1943, and carried the name of Leo W. Mossman, chief pharmacist at Holzer Hospital, Gallipolis, Ohio, as editor. Also appearing on the first page of this first number are messages from the SOCIETY's first president and secretary—Mr. H.A.K. Whitney and Miss Hazel Landeen. Membership in the SOCIETY at that time was less than 100. Efforts were being made by this small group not only to build a national organization of hospital pharmacists, but also to provide a publication which would serve as a medium for the exchange of information among those practicing in this specialty. Much has already been said concerning the role of THE BULLETIN as a contributing factor in the advancement of hospital pharmacy and the place which it now holds among the literature in our field. We therefore pause to recognize the role which the pharmaceutical and hospital literature plays in the advancement of hospital pharmacy and the extent to which the development of various phases of practice are dependent upon recorded information.

The relationship of literature in any field to the development of the profession is worthy of particular attention. Further, this becomes increasingly important as both the organization and the specialty which it represents grows. In hospital pharmacy today, we have established the precept that a continuing interest in the pharmacist's role on the medical care team provides a great challenge. In meeting this challenge each of us knows the great need for an exchange of information. This serves as an adjunct in the day-to-day practice and gives a background for working out new and better ways to meet problems which arise. Nor can we be concerned only with a single phase of our practice, be it ever so important, but we must also provide ourselves with a background of information and sources of information. The hospital pharmacist of today can no longer rely entirely on his basic knowledge—he must be a master in keeping up with current trends in therapeutics, new equipment and methods of operation, medical care programs, and the total hospital program. It is this phase of our practice for which the various pharmaceutical and hospital publications have been established. Not only THE BULLETIN, but other publications as well—the *Journals of the American Pharmaceutical Association; American Professional Pharmacist; The Hospital Pharmacist* (Canada); *Hospitals,* the Journal of the American Hospital Association; *Hospital Progress,* the Journal of the Catholic Hospital Association; and many others—all serve hospital pharmacy well. It is the extension and use of this literature which constitutes an important phase of the hospital pharmacist's professional activities.

Recognition is also due those who have contributed and supported these publications through the years. Individual hospital pharmacists who have contributed articles and advertisers who have taken this opportunity to present their products to those practicing in hospital pharmacy, have all made a significant contribution to the profession.

Publication of THE BULLETIN and contributions to other publications provides a means for carrying out one of the objectives of the AMERICAN SOCIETY OF HOSPITAL PHARMACISTS—to increase the dissemination of pharmaceutical knowledge by providing for an interchange of information. That the last ten years have given hospital pharmacists in this country an unparalleled opportunity for the exchange of information is unquestionable. Continuation and utilization of this phase of our activities will be an even greater factor in the advancement of the profession during the future years.

Barbiturate Intoxication

A Medical Staff Conference

DR. BARKER: Because of the nature of the subject for today's conference and the possible embarrassment to the patient, the clinical abstract will be presented in her absence.

DR. FOLSOM: The patient, a twenty-six year old white female, was admitted in coma on November 2 at 4:30 P.M She had been heard to fall in her apartment about 3:00 A.M. the morning of the same day. Her landlady found her unconscious that afternoon at 4 o'clock. In the surgery clinic where she was admitted her mouth was found to be filled with a white paste, and her stomach was lavaged.

She previously had been seen here in 1949 with complaints of diplopia, ataxia, and bizarre sensory disturbances. She had been given a very thorough examination at that time and it was felt that the symptoms were on an emotional basis, so she was transferred to the Neuropsychiatric Institute where she received ten months of psychotherapy. During that time she made several attempts to commit suicide. Following this, because of her lack of progress, she was transferred to the Ypsilanti State Hospital with a diagnosis of psychoneurosis with depression. She spent eighteen months there and received shock therapy, not electric shock, but scopolamine and another form. Following discharge she developed convulsions and since then had been taking phenobarbital and Dilantin each day.

Upon the patient's admission here her blood pressure was 120/80 R.A.R., pulse 100, respirations 16. She was a completely unresponsive young woman. There was puffiness of the eye lids and edema of the conjunctiva. The ocular

Adapted from a report published in the *University of Michigan Medical Bulletin* 19:1,1953.

PAUL S. BARKER, M.D. is Professor of Internal Medicine; JOHN H. FOLSOM, M.D. is Assistant Resident; MAYNARD B. CHENOWETH, M.D. is Associate Professor of Pharmacology and ARTHUR L. DREW, M.D. is Assistant Professor of Neurology at the University of Michigan Medical School, Ann Arbor, Mich.

fundi were normal. There were numerous bruises on her arms. The scars of previous attempts at suicide were observed on her wrists and antecubital fossae. The deep tendon and corneal reflexes were absent and she did not respond to any stimulation. The remainder of the findings were normal.

Laboratory studies showed the blood and urine to be normal. The white paste that had been found in the mouth could be rolled up into a mass about the size of a marble and it proved to contain barbiturate. There was a trace of barbiturate also in the urine.

As soon as the patient had been admitted to the floor an airway was put in place, and nasal oxygen begun. Special nurses around the clock were provided. The patient was started on penicillin and received Dilantin in oil per rectum after she had begun to respond. When she first arrived on the floor we gave her 1 gram of caffeine-sodium benzoate, and 5 percent glucose solution was given intravenously. As soon as we were able to get intravenous Benzedrine we put 80 mg. in the first 1,000 cc.-bottle of 5 percent glucose, in addition to Metrazol, 0.1 to 0.3 gram, at varying intervals. After this, at about 1:00 A.M., because her intravenous fluid intake was going to be enormous, we let the 5 percent glucose run in very slowly and injected the Benzedrine into the tubing. She received 20 mg. every twenty minutes for a total of 1,380 mg. When she began to respond the dosage was cut progressively until finally she was receiving 10 mg. every 3 to 4 hours. By 12:40 P.M. of the next day she had received a total of 1,610 mg. On the night of admission at 8:00 P.M. she had blinked her eyes, and by 10:45 P.M. had groaned. The corneal reflexes and biceps reflexes were elicited rather faintly then. She responded the following day to spoken voice, with movement and attempts to open her eyes. The next day she remained at about the same level of consciousness. On the fourth day after admission she was awake and could answer questions, and at this time denied having taken barbiturates and had no recollection of the several days preceding her admission. At the present time she has been transferred to the Department of Neurology and is having further examinations in order again to determine if organic disease is present.

DR. BARKER: This unfortunate patient presents a subject of importance. Such problems are seen often enough that it is necessary to have a working knowledge of the condition and management of it. Indeed, the recovery of the patient depends upon the proper treatment being given. We are fortunate today in having our friends from the Departments of Pharmacology and Neurology to discuss this problem with us. First, Dr. Chenoweth, from the Department of Pharmacology, will discuss the pharmacology of the barbiturates with special reference to intoxication and to addiction.

DR. CHENOWETH: You all know something about the pharmacology of the barbiturates, and what I have to say is perhaps a recapitulation of what you carry in your heads. But I do have a few points that may not be generally familiar. The first is that the barbiturates are general depressants; by that I mean that they depress function not only of the central nervous system but also of such organs as the heart, liver, and kidneys. The possibility exists that during intoxication, involvement of the heart or other organs may become a problem, although only in the laboratory do we see very much in the way of changes not due to the primary effect upon the central nervous system.

The primary effect on the central nervous system is a depressant one. This effect is rather like that of alcohol and can be differentiated quite clearly from the actions of morphine. With morphine, you will recall, there are rather specific effects upon the perceptions and the mood of the individual which are not seen with the barbiturates.

Among the barbiturates we have two major categories, of which only one is of primary interest today. This group contains the depressant barbiturates. I can dispose of the excitant barbiturates rather quickly, but we should mention the fact that there are barbiturates which exert no depressant effect whatsoever; they are purely convulsants. Obviously they have not found their way into the clinic and you are not likely to encounter cases of poisoning from them.

Of the depressant barbiturates we make a simple classification into those which are short-acting, such as thiopental, those which are of medium duration of action such as pentobarbital, and those which have a long duration of action like phenobarbital. We know little as to why the medium- and the long-acting compounds are different in their duration of action. Some of the longer-acting compounds take longer to get into the central nervous system. An outstanding example is that of sodium barbital, where even by intravenous injection nothing happens for about twenty minutes. The reason for the delay is simply that the sodium barbital cannot penetrate rapidly into the central nervous system. It probably cannot get out very quickly either, so that once in, the effect persists for a considerable time. We do know a little bit more about the short-acting barbiturates which are, as a group, remarkably shorter in duration of action than the other barbiturates. We had always thought that

this was the natural consequence of the rapid metabolism of thiopental, particularly in the liver, which makes it virtually useless by mouth in any reasonable dose. This is because the first organ it reaches in the portal circulation is the liver. But now there is a second and growing body of evidence which points toward the accumulation of thiopental, and in fact all of the short-acting barbiturates, in body fat as an explanation. When thiopental is given, it acts upon the central nervous system in its typical fashion. There is detoxication going on rapidly and at the same time there is a redistribution into the fat, accounting for the rapid disappearance of the drug from the blood. Practical implications are apparent, for obese individuals on the whole require more thiopental for anesthesia than their size and weight, if it were ordinary tissue, would indicate. We can demonstrate by repeated injections in both men and animals the accumulation of effect of thiopental.

Turning now to metabolism of the barbiturates we find that the majority, particularly the short-acting ones, are metabolized. The metabolic products of the barbiturates have been the subject of intensive study within the last five years. I won't go into the chemical reactions—unexpected reactions—which give rise to the metabolites which have been isolated or detected. These metabolites have been found to be without hypnotic activity. In the case of phenobarbital, detoxication plays a minor role in the removal of the compound from the active site. This compound is excreted in large part in its unaltered form. A vivid demonstration of this can be observed in the chicken, which has no way of getting rid of this type of compound. Once anesthetized with the longer-acting barbiturates it remains anesthetized indefinitely.

We are more and more concerned with the chronic administration of the barbiturates, not as anesthetics, but as sedatives. There appears to be a critical dose range for most barbiturates beyond which toxic manifestations develop. This is a very high level in most cases. Something on the order of 3 grams per day of thiopental could be critical. If this high dosage is continued for a sufficient length of time, usually a matter of months, sudden withdrawal of the barbiturates will produce a clear-cut withdrawal syndrome. This is quite different in its appearance and character from morphine withdrawal and generally speaking is more dangerous. Violent grand mal seizures are not uncommon in this situation. They can be controlled with barbiturates, with alcohol, and probably with ether, or any other general and powerful depressant. They may be seen when large doses of barbiturates are given acutely, for example, 10 grams of barbiturate during anesthesia.

As to the mechanism of action of the barbiturates, we know about as little now as when Fischer first synthesized Veronal, despite a very extensive amount of work and an extraordinarily large literature. Generally speaking, it can be shown that concentrations of barbiturate roughly within the dosage range expected in man will produce decreased oxygen consumption of brain tissue. This decrease in oxygen consumption is probably the result of disconnection between the phosphorylation process and that of oxidation in the mitochondria. If you are versed in cellular matters, you might wonder why dinitrophenol is not commonly an anesthetic, and under proper conditions it is. The barbiturates are potentiated by agents having dinitrophenol-like effects on fatty acid metabolism or phosphorylation. Of these, Antabuse is one. Aureomycin is another potentiator which you might run into. The weed killer, 2-4-D, is still another, and anoxia *per se* is another powerful potentiator of the barbiturates.

DR. BARKER: Dr. Drew, of the Department of Neurology, will now discuss the clinical features of barbiturate intoxication and its management.

DR. DREW: I plan to discuss the acute intoxication rather than chronic addiction, since that is the topic of the present conference.

Pharmacology
Acute Intoxication

Dr. Chenoweth has raised an extremely important point which must be considered in the discussion of therapy of acute barbiturate intoxication. It has long been thought that the barbiturates may have a selective depressive action on the brain stem before any depressive action on the cortex occurs. Many of the drugs that we use in treatment are agents which have a relatively selective stimulating action on the brain stem. To me, the crux of the problem of the pharmacologic therapy of barbiturate intoxication rests in this problem of the selectivity of action of the barbiturate. If the brain stem is depressed at first, then we have good reason to use some of the stimulants in common practice. If, however, the cortex is first depressed, then probably most of the drugs we use for stimulation are not helpful.

By way of introduction, I would like to outline another case of acute barbiturate intoxication which we have treated within the past two weeks. It illustrates some of the complications of acute barbiturate poisoning and emphasizes some of the problems in the treatment of this condition.

This patient was a 62 year old man who is a known epileptic. Like so many epileptics, he did not care to take his anticonvulsive medication and

went into status epilepticus. He was admitted to another hospital, given ether anesthesia, Avertin, and finally massive doses of intravenous sodium amytal. He was brought to this hospital in a profound coma. His blood pressure was 92/60, respirations were 50, temperature was 105.8 degrees, and his pulse was 90 and irregular. Because of this epileptic background and his precarious cardiac status, it was decided that stimulation would be unwise. Medical consultants undertook digitalization and control of the cardiac status. No stimulants were given. An immediate tracheotomy was performed. Oxygen was given by catheter, and penicillin and streptomycin were given. Fluid balance was controlled as well as possible, guided by both clinical and laboratory criteria. The patient came out of coma in almost exactly the same period of time as did the girl you have just heard about, who got a tremendous amount of Benzedrine. The epileptic patient I have described presents one of the worst types of barbiturate poisoning. The cardiac difficulty, evidence of pulmonary infection, dehydration, and a background of epilepsy all present major problems in therapy. I personally doubt that maximal doses of stimulants would have helped this man.

It has been brought out that one can give picrotoxin to the point of convulsions without restoring consciousness. Perhaps this is an illustration of central nervous system depression which cannot be entirely overcome by excessive stimulation. It would appears that barbiturates, by and large, cause depression of the cortex but may leave it accessible to sensory stimulation which interferes with the intrinsic pattern. This raises a problem in an epileptic patient. As you know, we use barbiturates in order to potentiate abnormalities in electroencephalographic recording. Seizures are seen in barbiturate anesthesia, as well as in other forms of anesthesia, and they may also be seen in chronic barbiturate intoxication. Electroencephalographically, there is observed a phase of cortical excitation with administration of barbiturates. This must be considered in the treatment of any epileptic who has taken or has been given, an excessive amount of barbiturate drug. Many of the barbiturate poisonings which we see occur in epileptics, and the problem of the use of convulsion-stimulating drugs in an epileptic patient is a serious one. The physician gets into a situation where he has to "titrate" the therapeutic convulsions against the barbiturate coma, and in the epileptic patient, such a titration can be an extremely delicate procedure. One stimulates to the point of a seizure, and then has to give barbiturates in order to control the seizure.

The use of strong stimulants in the patient with cardiac disease is also a serious clinical problem. An additional complication, pulmonary infection, was for many years responsible for many of the deaths in barbiturate poisoning. It is interesting to note a figure of 7 percent fatality in moderate cases of such poisoning and a 15 percent mortality rate in severe cases. These figures are mostly from the era prior to good antibiotic therapy. It will be of extreme interest to see whether the percentages are altered by more adequate methods of combating intercurrent infection.

You will note that a tracheotomy was performed almost immediately on the second patient. Careful attention to an adequate airway is mandatory in the management of barbiturate coma. I happened to be an advocate of tracheotomy rather than intubation because the former causes less irritation and is somewhat easier to handle on the ward. I also believe that better tracheal toilet can be performed through tracheotomy. In addition, I would advocate extremely careful attention to fluid balance, and again, would stress the prevention and management of intercurrent infection. Other complications, frequently for-

TABLE 1.—*Sedative Drugs Listed as Causes of Death*[1]

Drug	*No. of Cases*
Barbiturates	**377**
barbital, 6	phenobarbital and Amytal, 1
barbiturate, 170	Ortal Sodium, 1
barbituric acid, 2	Seconal, 16
Carbital, 1	Sodium Amytal, 15
Delvinal sodium, 1	sodium barbital, 1
luminal, 12	Tuinal, 2
Nembutal, 28	Veronal, 4
pentobarbital, 2	Veronal and Sodium Amytal, 1
phenobarbital, 114	
Alkaloids	**46**
alkaloidal poisoning, 1	morphine and Sodium Amytal, 1
codeine, 3	morphine sulfate and nitroglycerin, 1
codeine and Nembutal, 1	opium, 2
laudanum, 1	sleeping powder containing opium, 2
heroin, 1	Pantopon, 1
morphine, 27	paregoric, 2
morphine and barbital, 1	
morphine and codeine, 1	
Paraldehyde	**13**
paraldehyde, 12	
paraldehyde and Nembutal, 1	
Chloral	**7**
chloral, 1	chloral hydrate and bromide, 1
chloral hydrate, 5	
Bromides	**4**
Undefined sedative drugs	**8**
narcotic, 1	marijuana, 1
drug addiction, 1	sedative, 5
Total	**455**

gotten, are decubiti and pressure palsies. It is extremely embarrassing to pull one of these patients through only to find that he has developed one or more peripheral nerve palsies, due to his having been permitted to let his legs hang over the side of the bed.

The previous speaker has mentioned the apparent similarity of alcoholic and barbiturate coma. One point has been made which may stress a dissimilarity. Picrotoxin is said not to be helpful in alcoholic stupor, whereas it frequently is felt to be helpful in barbiturate intoxication.

I have said very little about drug therapy in barbiturate coma. My own feeling is that careful attention to airway, intercurrent infection, fluid balance, and watchful waiting will probably give as good results as excessive stimulation. I do not care for the idea of giving stimulants in large amounts to patients who are known epileptics. This raises one final point in management. You may have noticed in the case first presented, Dilantin by rectum and then by mouth was given as soon as possible to guard against the recurrence of convulsive seizures. This is an extremely useful additional bit of therapy, and is certainly not contraindicated in barbiturate poisoning. It may also be kept in mind in cases of barbiturate poisoning which have no epileptic background. As is pointed out above, the withdrawal of barbiturates may precipitate seizures. This usually occurs in chronic barbiturate intoxications, but can occur in the more acute forms.

DR. BARKER: The question of which is depressed first is the crux of the problem of treatment. If the brain stem is depressed first, then we have a good reason to employ some of the stimulants we use. If the cortex is depressed initially, then probably much of the stimulation we use is not too helpful. In terms of fatality, some figures compiled a number of years ago, from large city hospitals in New York, recorded around 7 percent fatality in hospitalized cases. When the cases of poisoning were very severe, fatality rate went up to 15 percent.

We are particularly impressed with the emphasis on airway and the prevention of infection because in the past death was so often due to infection, usually pulmonary. Now we are in the fortunate position of having antibiotics to prevent this.

Mortality

DR. CHENOWETH: Those who have witnessed pharmacologist versus clinician on "barbiturates" may be feeling shortly that they paid for a ringside seat at the fight and the fight was called, because I really haven't very much to argue about with Dr. Drew. I came here prepared to emphasize many of the same points which he has already brought out, so perhaps by having two people say the same things in different words we will put over our point very soundly.

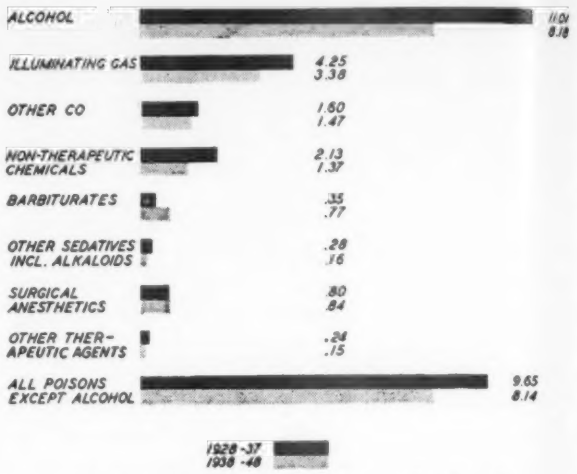


FIG. 1.—Annual mortality from poisonings in Massachusetts per 100,000 population.[1]

You might be interested in some figures which appeared in the New England Journal of Medicine[1] on the incidence of barbiturate intoxication and other poisonings. They compare mortality data per hundred thousand in Massachusetts in the decades 1928 to 1938, and 1938 to 1948 (Fig. 1). We see that alcohol is still king. Its effect was greater during the period of prohibition, perhaps because of the high incidence of deaths from wood alcohol poisoning. Illuminating gas dropped off a trifle in the second decade and carbon monoxide has also declined in frequency, as have nontherapeutic chemicals. But barbiturates, on the other hand, have doubled in terms of the production of deaths by poisoning in Massachusetts. I am sure that this reflects the situation throughout the world. Surgical anesthetics have remained constant as a factor.

In Fig. 2 we see a comparison of the total poisoning mortality and the suicide attempts with barbiturates. One will notice that the total mortality curve and the total suicide curve have gradually crept together. Apparently, more and more people are committing suicide with barbiturates. The use of powerful alkaloids has declined rapidly. Table I shows some of the poisonous compounds people have selected. Virtually every barbiturate sold now and some not sold any more are in that list. I'd like to point out: paraldehyde 12, chloral hydrate 5, even the bromides are represented. In other words, it tells us that if one provides a depressant drug to a mentally depressed patient and he decides to commit suicide he will do so quite effectively whether it is a barbiturate or some other drug.

We are not often so fortunate as to find an actual bottle of phenobarbital beside the unconscious victim to tell us it is barbiturates that have been employed. One might inquire as to the tests used to identify as a barbiturate the compound found in this patient's mouth, and whether they would differentiate the barbiturates from the very closely-related chemical compounds such as the anticonvulsants.

We know that this patient had a respiratory rate of 16, and her blood pressure was 120 over 80. I think that my blood pressure, if I were the resident on the ward, would drop appreciably as these observations were made, because anyone with a respiratory rate of 16 per minute, while depressed, is still breathing well. I think the odds are almost even that had the patient been followed carefully for a couple of days, she would have recovered without treatment at all. Now that is not to say that we should disregard these individuals. The points that have been made so far by Dr. Drew are to be stressed. Adequate airway is absolutely the number one detail of importance. It's going to be up to the physician to decide on tracheotomy, or on intubation. But if the airway is obstructed for any reason, or appears ineffective, then intubation or tracheotomy is positively and immediately indicated.

Attention should be paid immediately to establishing adequate respiratory exchange and this includes the institution of artificial respiration if it seems at all indicated. Oxygen, I think, is beneficial if respiration is already proceeding. Since the number of respirations a minute may be quite a bit lower than normal, the total oxygen saturation of the blood may be expected to be decreased. At this stage in treatment, when the patient is not going to die immediately, one may attempt gastric lavage. In the presence of a tube it is going to be a little difficult, but it should be done because one may find recoverable in the wash quite a few grams of barbiturate which would otherwise have to be absorbed and detoxified. Since some of these individuals turn out as coroners' cases no matter what you do, a very good sample of the washings should be kept for the state toxicologist.

If respiration is still inadequate, why not use what seems to be the most effective way of maintaining respiration that we have at hand today, the Drinker respirator? Why can't one of these patients be put into either an iron lung or one of the many chest respirators at hand?

If respiration can be maintained adequately but the dose of barbiturate is so great that some secondary organ is involved, such as the heart, one should rely upon the use of digitalis which overcomes barbiturate depression of the myocardium very effectively. But the patient's chances at this point have almost vanished, and he will probably join that group of 7 to 15 percent mortalities.

The administration of antibiotics for the prevention of bronchial pneumonia and other infections is routine in most hospitals now and should be continued, I am sure.

Analeptics

That leaves to the last moment in the discussion the use of analeptics, and I can very vividly imagine Dr. Drew's predicament in giving stimulants such as picrotoxin or Metrazol (pentylenetetrazol) to an epileptic patient. I have frequently used these compounds to induce sublatent con-

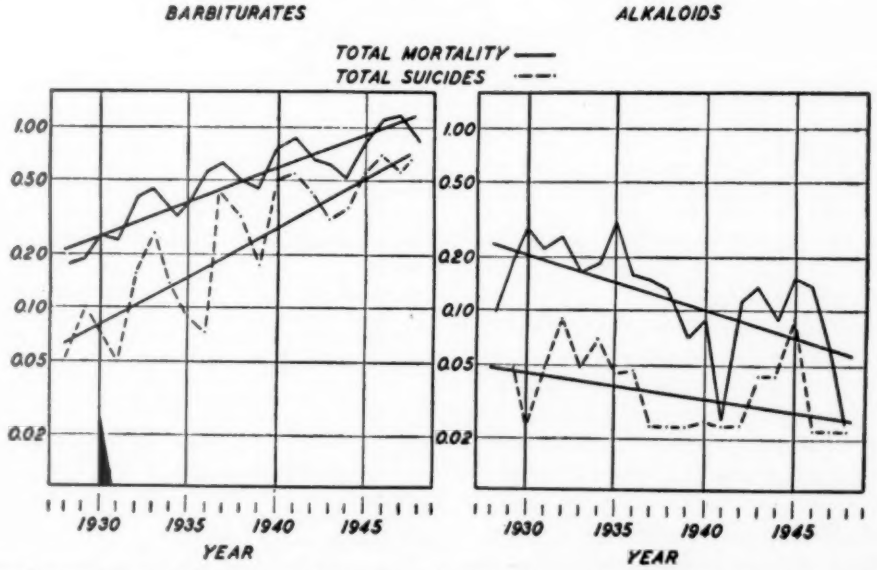


FIG. 2—Annual mortality per 100,000 population from barbiturates and alkaloids; Massachusetts, 1928-1948.[1]

vulsions in various animal experiments with great success. I am sure they have been used, particularly Metrazol, to set off convulsive seizures for the electroencephalographer's convenience. In the presence of severe barbiturate depression their use appears to be less hazardous, but still must be considered occasionally. I would prefer not to give stimulants as the depression wears off.

As to which respiratory stimulant is of value, the kind of information needed for a dogmatic statement is really not available. On the whole, we can say that caffeine and ephedrine are relatively feeble; that Metrazol and picrotoxin are powerful. But their use raises the very serious problem of having to adjust back and forth between a convulsion and a depression, hoping to come out ahead. Amphetamine, which was the drug chosen here, does not cause convulsions, although it has a profound effect upon general cortical function. It will also stimulate respiration which is moderately depressed by barbiturates. I personally question the value of these drugs when respiration is so retarded that the depression becomes a hazard to life. In other words, if you cannot institute artificial respiration, these drugs probably will be of no value either. And if respiration is not so depressed that these drugs will stimulate it, then it is not dangerously depressed.

One may then query, "What about any of these? Are they of any value at all?" That is a very hard thing to evaluate. The literature, if you looked at it from the clinical point of view—case history *with* and case history *without* such drugs—indicates that perhaps those treated with more powerful respiratory stimulants do better than those treated with the weaker ones. It may only mean, however, that more attention was paid to the patients who were treated in this fashion, that they were watched, turned when necessary, rotated, and were detected if they turned blue or vomited. Perhaps the patient who did not receive these drugs was not always under such close observation.

Amphetamine, not causing convulsions, may be employed with considerable impunity. The question of toxic effects of large doses of this drug is well taken, and there have been cases of pulmonary edema occasioned by amphetamine which killed the patient when the barbiturate did not. This is certainly an anticipated complication of extensive use of amphetamine as an analeptic. Amphetamine does have interesting advantages; if the myocardium is depressed by barbiturates, amphetamine can relieve that depression to a degree.

A word about succinate, about which so much has been written and so little proved: the Harvard anesthesiology group has shown[2] that administration day after day of anesthetic doses of thiopental intravenously results in a slightly increased degree of depression. We would expect such an effect from observing this type of procedure in animals. Having established some sort of base line as to how a patient would behave, they began the administration of succinate intravenously (2.6 grams per minute of sodium succinate preparation) to a volunteer. It was noted that there was no significant difference in any respect as to the duration or depth of induced barbiturate anesthesia. The following day the subject was given a barbiturate anesthesia and once again the same general pattern of behavior occurred. This follows very logically what we know today about the role of succinate in metabolic inhibitions occasioned by the barbiturates. It *should be* of no value, and in this best of all tests, it *is* of no value. I'm sure you will be able to find many articles contradicting that statement.

In summary then, with regard to intoxication by the barbiturates, if we substitute other depressants, other sedatives, for the barbiturates, they will be subjects for articles in the popular magazines. It appears that depressant drugs are going to be used for suicidal purposes and that by eliminating the barbiturates the physician may be contributing only to the change in selection of a drug used in self-destruction. If we take our poisoning with barbiturates as it comes and preferably undertreat rather than overtreat, particularly in regard to the use of stimulants, I think recovery will be more common. An adequate airway, the use of oxygen, and treatment of infection and inter-current complications are important in the maintenance of life once respirations are reasonably adequate. The appended references may be of general interest.

REFERENCES

1. Moore, M.; Alexander, L.; and Ipsen, J., Jr., Deaths from Poisoning: Massachusetts, 1938-1948, *New England J. Med. 246*:46, 1952.
2. Tucci, J. H.; Brazier, M. A. B.; Miles, H. H. W.; and Finesinger, J. E.: A Study of Pentothal Sodium Anesthesia and a Critical Investigation of the Use of Succinate as an Antidote, *Anesthesiology 10*:25, 1949.
3. Maynert, E. W.; Brodie, B. B.; Shideman, F. E.; Wikler, A.; and Bain, J. A.: Symposium on Fate and Mechanism of Action of the Barbiturates, *Federation Proc. 11*:625, 1952.
4. Maynert, E. W., and Van Dyke, H. B.: The Metabolism of Barbiturates, *Pharmacological Rev. 1*:217, 1949.
5. Isbell, H., and Fraser, H. F.: Addiction to Analgesics and Barbiturates, *ibid. 2*:355, 1950.
6. Wikler, A.: Sites and Mechanisms of Action of Morphine and Related Drugs in the Central Nervous System, *ibid. 2*:435, 1950.
7. Butler, T. C.: Theories of General Anesthesia, *ibid. 2*:121, 1950.

comparisons between

PHISOHEX, ACTAMER and SEPTISOL

as germicidal agents for the skin

by S. H. HOPPER, A. V. R. BECK *and* K. M. WOOD

TO DEVELOP A RELATIVELY inexpensive surgical soap it is necessary to continually test new germicidal agents as they are made available. The results of a comparison between *p*-chloro*meta*-xylenol[a] and Phisohex[b] have been reported.[1] In this preliminary work we recommended that no change be made in the present surgical scrub technique in which Phisohex is used. The following is a detailed report of tests with Actamer[c] and Septisol[d] and a comparison of each with Phisohex. Each experiment was done with six subjects.

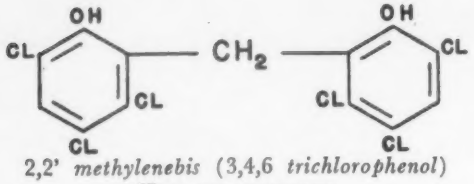
a. Ottawa Chemical Co., Toledo, Ohio
b. Reg. trademark Winthrop Stearns Co.

S. H. HOPPER is associate professor of public health, A.V.R. BECK is chief pharmacist and K. M. WOOD is manufacturing pharmacist, all at Indiana University Medical Center, Indianapolis, Ind.

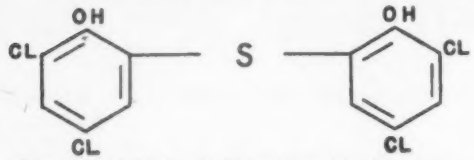
Methods and Materials

Actamer is 2, 2'-thiobis (4,6-dichlorophenol),[2] Figure 1, described as a highly bacteriostatic agent against gram positive organisms, and designed for topical use. The manufacturer claims a low order of toxicity to mammals. An independent check for toxicity for mice confirms this claim.[3]

c. Trademark Monsanto Chemical Co.
d. Vestal Laboratories, Inc. St. Louis, Mo.



2,2' *methylenebis* (3,4,6 *trichlorophenol*)
HEXACHLOROPHENE



2,2' *thiobis*(4,6, *dichlorophenol*) ACTAMER

Soap Manufacture

Materials Required to Make Coconut Fatty Acid Soap Containing Actamer—(Hereinafter called CFA Soap):

Stripped Coconut Fatty Acid (Neo-Fat-255) Armour
Potassium Hydroxide Pellets—Mallinkrodt
2,2'-Thiobis(4,6-dichlorophenol) — (Actamer) Monsanto Chemical Co.
Glycerin, U.S.P.
Perfume Oil Compound No. 11420, Fritzsche Brothers
Resorcin Brown, N.F. (D & C Brown No. 1), Fritzsche Brothers.
Distilled Water

Equipment Required:

Electric Stove or Hotplate
Mixing Tank, stainless steel, 30 gallons capacity. Agitator with variable speed (i.e.: Lightning Mixer, Model CV-4)
Buckets, stainless steel, 5 gallons
Bucket, stainless steel, 10 gallons

Formula:

Actamer	2280.0 Gm.
Neo-Fat-225	15200.0 Gm.
Potassium Hydroxide	4590.0 Gm.
Glycerin	3800.0 cc.
Perfume Oil	100.0 cc.
Solution Resorcin Brown 5%	25.0 cc.
Distilled Water to make	20.0 gallons

Procedure:

1. Melt the fatty acid in the 10 gallon stainless steel container at a low temperature (melting point 30 to 40°C.) — avoid overheating.
2. While the fatty acid is melting, dissolve 2280.0 grams of potassium hydroxide in one gallon of distilled water, then slowly add the Actamer with constant stirring until the solution of the Actamer is complete.
3. In a separate stainless steel container, dissolve the remainder of the potassium hydroxide in one gallon of water.
4. Transfer the melted fatty acid to the 30 gallon mixing tank and then slowly add, with constant mixing at low speed, the plain potassium hydroxide solution. Slowly add the Actamer and potassium hydroxide solution.
5. Add 10 gallons of distilled water and mix at high speed (1700 RPM).
6. While the soap is mixing, add the glycerin, Brown Color and perfume oil.
7. Add sufficient distilled water to make 20 gallons of finished soap, and continue mixing until all lumps of soap have dissolved.

Precaution:

During the saponification process hydrogen sulfide is released. Excessive exposure to the gas should be avoided. Manufacturing should be done in a well ventilated room.

Bacteriology

The bacteriologic procedure was as outlined for the studies on P.C.M.X.[1] Briefly, it consisted of taking seven sterile basins. Into each basin put a sterile brush and one liter of sterile water. Each of the six girls would wet her hands and forearms with distilled water. She was then given the germicidal agent and asked to rub it thoroughly onto her hands and arms. Starting with the first basin, she would scrub with a brush for 45 seconds and rinse for 15 seconds with water from the basin in which she had been scrubbing. After this first minute had passed, she would proceed to the second basin and repeat the procedure, while another subject would start in basin No. 1. By this means there were six subjects per basin. It was felt that this would obviate chance variations in counts from one individual, and make the results more significant from a statistical point of view. Each basin was plated out using aseptic technique, and the culture medium was nutrient agar to which five percent sterile blood serum was added just before the plates were poured. All plates at any given dilution were in triplicate and the counts were made after 48 hours incubation at 37°C. A control basin containing a brush and water was tested for sterility during every trial. Comparisons were made between Phisohex, Actamer at 3 percent and also at 2 percent, and Septisol.

Phisohex

Each subject received 5 cc. of Phisohex and started scrubbing. The results over an eight day period are shown in Graph I. Note that by the fifth day, there was a considerable reduction in count which continued through the sixth day. The controls were sterile in all cases, showing that the brushes, basins, water and technique were all right. These results are typical of repeated tests.

Actamer 3 Percent in CFA Soap

Each subject received only 2 cc. of CFA soap because it was enough to produce a copious foam. Psychologically it was a success since the girls liked a soap which would foam so easily. The results over an eleven day period are shown in Graph II. By the fifth day there was a considerable reduction in count, which continued through-

out the remainder of this experiment. The *p*H of each basin was taken after the girls had scrubbed, and in all cases was either at the neutral point or within 0.2 of it. The controls were all right, as noted under Phisohex.

Actamer 2 Percent in CFA Soap

In order to determine whether we could reduce the cost of the CFA soap, we tried 2 percent Actamer, since it is the most expensive ingredient. The results are shown in Graph III. There was a reduction in count by the fourth and fifth days, but it did not seem to continue. The sixth and eighth days were relatively higher. The controls were all right, as noted under Phisohex.

Septisol

Septisol was used according to the instructions on the container. This called for diluting the soap with two parts of water before use. Each subject received 5 cc. of Septisol. There was some reduction in counts as shown in Graph IV.

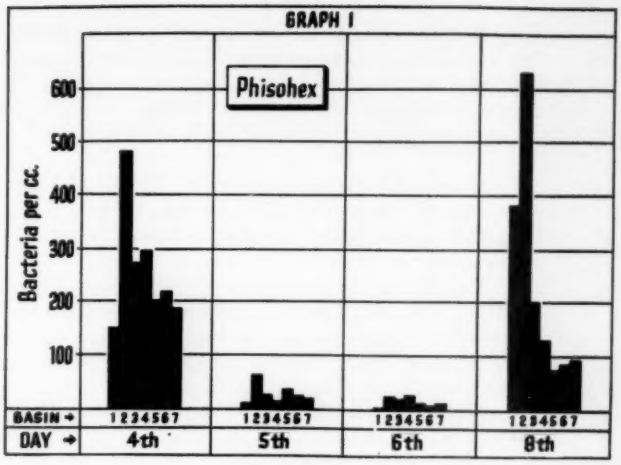
Discussion

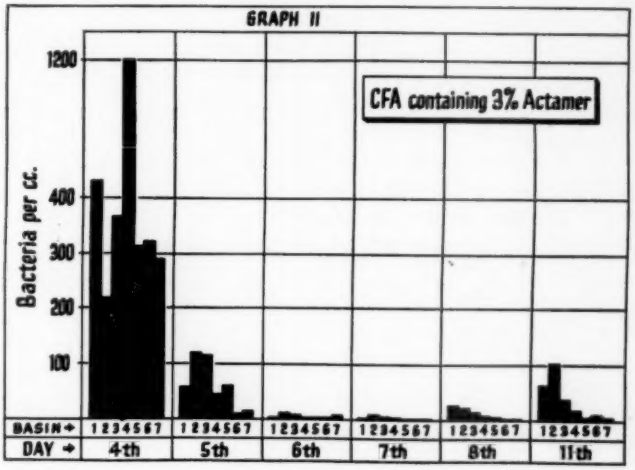
At the very outset, difficulty with the *p*H of the sterile water used for scrubbing gave results which appeared to be the same no matter what was used. The tap water of Indianapolis has a hardness of about 300 ppm. This is softened to less than 50 ppm for the hot water system of the University. We sterilized the hot soft water for use in the basins, and found the *p*H to be at the neutral point.

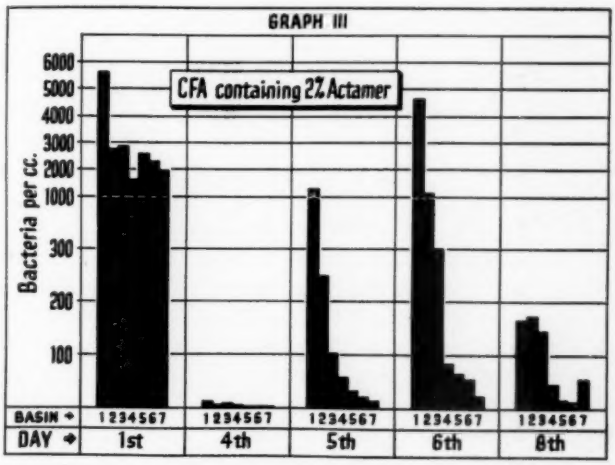
Another variable, of even greater significance, is the manner in which the germicidal agent is used by the subject. We usually started a group of girls on a Friday so that they would have used the soap for four days before we tested them again. We assume that the girls followed the instructions about not using anything else on the hands and arms except what we had given them. Each girl was supplied with rubber gloves to protect her hands from other soaps when it became necessary for her to do household chores involving a cleaning operation. An amusing note was the high incidence of broken dishes reported to us as a result of the use of the gloves. No cases of dermatitis were reported to us, but some of the girls complained about the drying effect of the CFA soap. In particular, they did not like to use it on their faces. The drying was overcome by supplying them with a lotion containing lanolin.

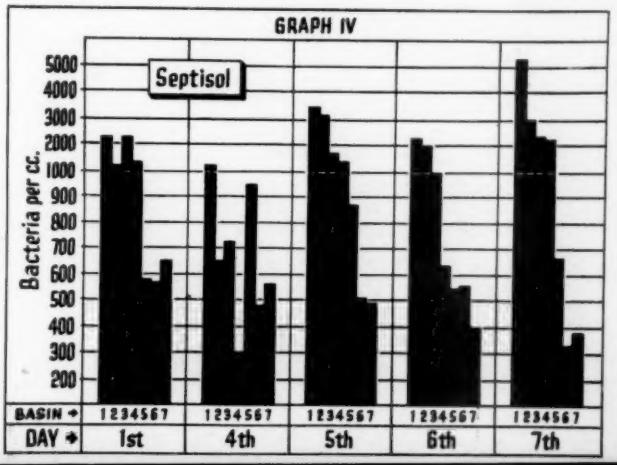
With respect to the manufacture of the CFA soap, the following comments may be of interest:

1. The *p*H of the finished soap may vary between 7.0 and 8.0.
2. The addition of glycerin aids in the clarity of the finished product and imparts emollient properties.









3. Actamer, like hexachlorophene, is light sensitive. Upon exposure to light, the CFA soap lost its straw yellow color and darkened. This was overcome by the addition of five percent Resorcin Brown to mask the color change. The activity of the Actamer was not reduced.

4. At room temperature the soap is clear and light brown in color. Cooling to 50°F. or less, turns it cloudy and white in appearance, but this clears up immediately upon warming.

5. The amount of Actamer in the CFA soap is three percent by volume. This is pointed out since commercially available products usually express the percent of germicidal agent on the basis of the percent of anhydrous soap content.

6. The CFA base is easily saponified and makes a stable soap which produces a copious foam.

7. Based upon present prices, the CFA soap will vary in cost from $1.00 to $1.50 per gallon in lots of 20 gallons.

Reference to Graph I indicates that with Phisohex the count of bacteria per cc. is reduced up to the fifth or sixth day. If we had better control of the conditions under which it was used, it is probable that the higher counts of the eighth day might not have occurred. In general, the reduction in counts was of such a high order of magnitude that it was acceptable to our surgery department.

Note that the three percent Actamer, as shown in Graph II, had an effect equal to that of Phisohex. The reduction in count was approximately the same. Preliminary results of bacterial counts on the hands of a subject using CFA soap and wearing sterile gloves for two hours have been made. The hands remained sterile for this period of time.

As indicated above, a CFA soap containing only two percent Actamer did not give results equal to those obtained with Phisohex. The Septisol preparation under our conditions of use, did not reduce bacterial counts to the same low level as either the Phisohex or the three percent CFA soap. Price[4] calls attention to the fact that "methods used to disinfect hands and fields of operation vary from hospital to hospital." He suggests that some council or commission should study the problem and develop specific recommendations for their routine use. Since there is no such thing as a standard surgical scrub, advertising claims based upon selected information continue to be made. No part of the work herein reported was supported by any commercial organization. The comparisons were made entirely on our own for the guidance of our surgical staff.

Summary and Conclusions

A description for the manufacture of a coconut fatty acid soap containing three percent Actamer is given. Comparison of this soap with Phisohex and Septisol was made in a series of hand washing experiments. In general it was felt that the reduction in bacterial count on the hands was of the same order of magnitude with either Phisohex or a coconut fatty acid soap containing three percent Actamer. The cost per gallon, if manufactured in the hospital pharmacy, varies from one dollar to one dollar and a half, if at least twenty gallons are made.

REFERENCES

1. Hopper, S. H.: P.C.M.X. (A Preliminary Report), *Bull. Am. Soc. Hosp. Pharm.* 10:202 (May-June) 1953:
2. Biological and Chemical Properties of 2,2-Thiobis-(4,6-Dichlorophenol) by R. S. Shumard, D. J. Beaver, and M. C. Hunter. Presented at the Chemical Specialties Manufacturers' Association Meeting, New York City, December 8, 1952.
3. Unpublished personal communication from Max C. McCowen, Head, Parasitological Research Department, Biological Research Division, Eli Lilly and Company, Indianapolis, Ind.
4. Price, P. B.: Present Day Methods of Disinfecting the Skin, *Arch. Surg.* 61:583 (Sept.) 1950.

P.C.M.X.

by S. H. Hopper

In the interests of economy in hospital management and operation, the pharmacy can contribute a great deal. That this is the case has been shown beyond any question by the facts and figures available at the Indiana University Medical Center campus. Following this policy an attempt was made to develop a relatively inexpensive surgical soap.

The manufacturing division of our Pharmacy made a soft liquid soap using stripped coconut fatty acids, saponified with potassium hydroxide. During saponification 3 percent *p*-chloro*meta*xylenol was added. The *p*H of this soap on the skin was approximately 7.0. Information provided us by the manufacturer claimed high germicidal properties for P.C.M.X. (See Figure 1) If the claims were correct the cost per gallon was on the order of magnitude of one-fifth or less of the existing costs for other surgical soaps. As a consequence we arranged to compare the relative germicidal

Presented at the Decennial Meeting of the American Society of Hospital Pharmacists, Philadelphia, August 22, 1952.

S. H. Hopper, Ph.D., is associate professor of Public Health, Indiana University School of Medicine Indianapolis, Indiana.

reduction of P.C.M.X.[1] soap with the result obtained using Phisohex.[2]

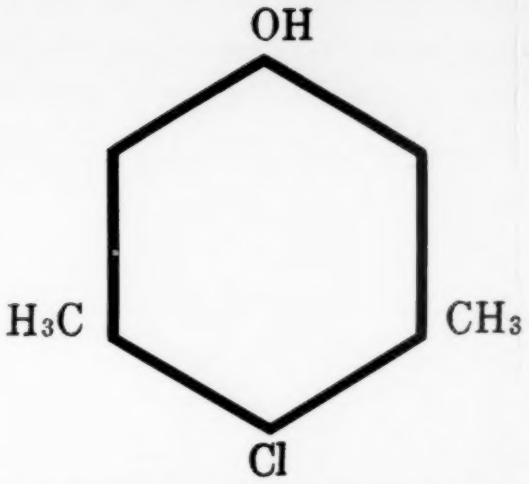
Seven sterile basins were lined up, each containing one liter of sterile distilled water and one sterile brush. Six office workers from the Medical Records Department of the hospital each washed in basin number one, then proceeded in order through basin seven. The use of six subjects per basin assured a high initial count from which comparisons could be made easily. This also gave a larger representative sample, obviated chance variations in one individual, and made the results more reliable. Each girl wet her hands and arms up to the elbow with distilled water. She then scrubbed for forty-five seconds and rinsed for fifteen seconds in each basin. Aliquot portions of each basin were taken and plated out, using aseptic technic. The culture medium was nutrient agar to which 5 percent blood serum was added just before the plates were poured. The purpose of the serum was to inactivate the germicidal compound and thus provide a more nearly true picture of the bacterial count. All plates were in triplicate and only counts between 30 and 300 colonies per plate were considered of value.

The test was started on a Friday, and each subject was given a four ounce bottle of Phisohex to be used at home. She was instructed to use only that soap on her forearms and hands during the period of the test. At the end of one week she was asked to revert to her usual soap for a one week period. This afforded enough time for her to reestablish her usual bacterial count. Following this interval she started again on a Friday, using the P.C.M.X. preparation. The bacterial reduction in the first few days is negligible whereas it is generally quite meaningful from the fourth day on. Thus, by starting on a Friday we were able to get counts from the fourth to the eighth day inclusive, without asking our subjects to come back in on a Sunday. There was an additional basin containing a brush which was used as a control to check the sterility of the equipment and the technic.

Summary and Conclusions:

The P.C.M.X. and Phisohex each reduced the bacterial count. Reference to the graphs shows that about 80 percent reduction was achieved with P.C.M.X., while about 98 percent was the case with Phisohex. There was no evidence of any skin reactions in any of the test subjects. No change is recommended in our present surgical scrub technic, since we have been using Phisohex.

1. Ottawa Chemical Co., Toledo, Ohio.
2. Registered trademark Winthrop Stearns Co.



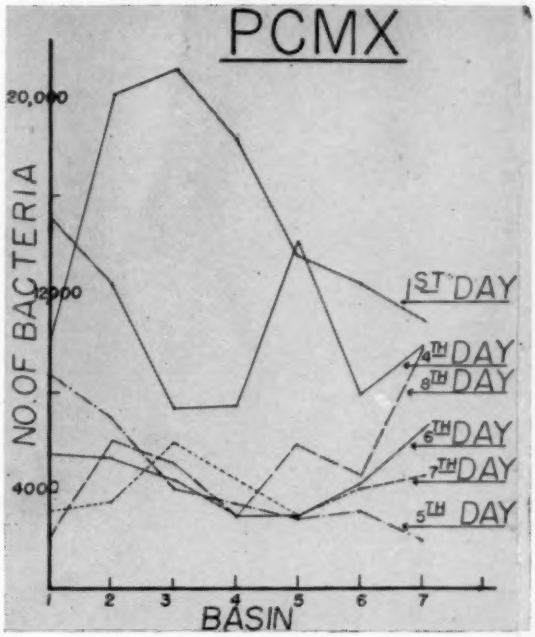
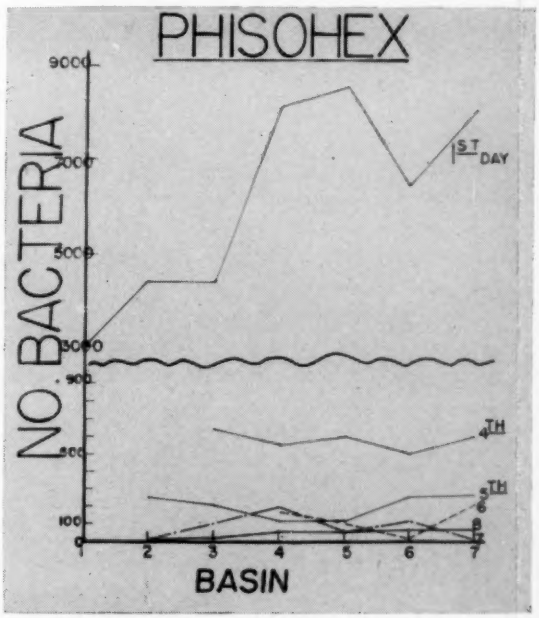
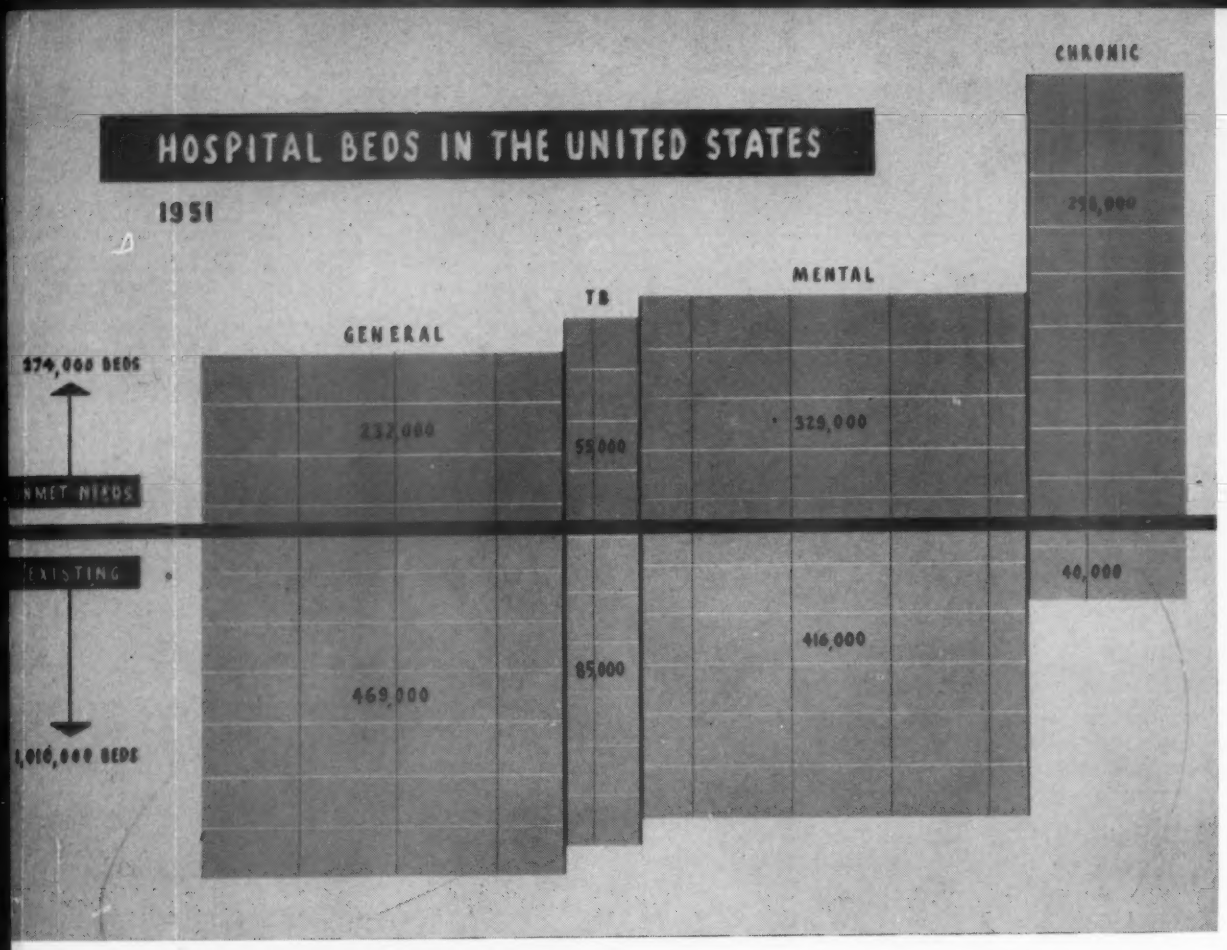


FIG. 1





Pharmacy and Hospital Expansion

by JOHN W. CRONIN

THE UNITED STATES currently has only 5 percent of its estimated hospital bed need. We are still faced with a deficit of about 880,000 beds. The modern hospital is the result of a profound change in the concept of hospitals, their design, function and place in our society. No longer is the hospital concerned only with the care of illness, but it also plays a role in the prevention of illness.

JOHN W. CRONIN, M.D. is Chief, Division of Hospital Facilities, Public Health Service, Federal Security Agency, Washington, D.C.

Presented at the annual meeting, American Pharmaceutical Manufacturers Association, Hotel Waldorf, New York, N. Y., December 9, 1952.

During the depression years, 1929 to 1939, there was very little hospital construction in this country. During the World War II years the essential materials needed for hospital construction were required to support the war effort, and therefore, not available.

The Community Facilities Program, authorized by the Lanham Act in 1939, included hospital construction, but only in the war-impacted areas. It was soon established that there was a need for an orderly method of meeting the great shortage of hospitals. Facts about the problem were needed so, under the auspices of the American Hospital Association, the Commission on Hospital Care came into being.

This Commission was under the able leadership of Dr. A. C. Bachmeyer, and was supported by the American Medical Association, other health organizations, and the Public Health Service. In addition, the labor and farm groups, among others, lent their support. The result was the National Hospital Survey and Construction Act of 1946. This program is popularly known as the Hill-Burton Program because Senator Lister Hill of Alabama, a Democrat, and Senator Harold Burton of Ohio, a Republican, introduced the Bill in Congress and guided its destiny.

Purpose of The Act

The purpose of the Act is to help the state and local communities build hospitals and health centers where they are most needed. This is accomplished in two steps. First, Federal funds were authorized in the amount of $3,000,000 for grants for survey and planning. These funds are allocated to the states on a population basis and each state matches the Federal allocation on a 2 to 1 ratio. Second, Federal funds for construction purposes were set at $75,000,000 annually, for five years, 1947-1951. The matching funds required of the local community, or from the state and local community, were again on a 2 to 1 ratio. The allocation to the states was on a formula basis; the controlling factors being population and per capita income.

Three years after the program had begun, it was readily apparent that many of the top priority areas were unable to raise the necessary two-thirds of the cost of project and thus participate in the program. The 81st Congress amended the original law on October 25, 1949. The amendments extended the program until June 30, 1955; increased the annual authorization from $75,000,000 to $150,000,000; permitted the states to set the Federal participation (between a minimum of one-third and a maximum of two-thirds of the cost of each project); and authorized $1,200,000 in grant for research in hospital utilization and hospital service studies and demonstrations. This latter amendment, unfortunately, has not been implemented by an appropriation. It is urgently needed.

Accomplishments

What has been accomplished in the last five years? As of December 1, 1952, over 1,950 projects have been approved in this Federal, state, and local community endeavor. More than 1,000 projects are completed and in operation. Nearly 800 are under construction.

Ninety-two thousand beds have been added. Yet the population increase each year, combined with the obsolescence rate of our hospitals, accounts for nearly 30,000 beds each year which we must find some way to overcome if we are to achieve a semblance of meeting the hospital bed need.

The total program exceeds the one billion and a quarter level. The Federal funds amount to 542 million and the sponsors have matched this with 900 million dollars. Of all the projects approved, nearly three-fourths are for general hospitals, most of them new. In fact, over 600 communities now have hospitals where none existed heretofore. Three hundred fifty public health centers and seven State Health Laboratories are provided. The development of hospital services in needy areas, especially rural areas, is slowly being accomplished. In addition, the teaching areas and medical centers are receiving proportionate assistance.

The construction of these hospitals has had an impact on these small communities. The primary benefits accrue, of course, to the patients who are admitted and cared for. Equally important, however, is the effect of construction of a new hospital in an area where no hospital previously existed for the availability of medical services. The construction of new hospital facilities furnishes the motivation for physicians to move into the community. In addition, many nurses and technicians living in the community who had dropped out of their professional fields because there was no such employment readily available are returning to work in these hospitals, either on a part or full-time basis.

Pharmacy Plans

It was evident at the beginning of the program that in order to carry out the intent of the law and regulations with regard to facilities and equipment, guide materials should be developed. Each particular aspect of hospital operation was studied. It was found that few hospital pharmacies were planned before the hospital was built. Floor plans and equipment lists of various size general hospital pharmacies were needed to assist the architects and hospital administrators in planning the hospital. Under the direction of Pharmacy Consultants in the Division of Hospital Facilities, Public Health Service, suggested plans, equipment lists and organizations for hospital pharmacy departments were prepared for 50, 100, and 200 bed general hospitals. In the development of those plans and equipment lists endless hours of research and study was necessary to answer questions such as: What departments in the hospital will the pharmacy service? What type and volume of work will be involved? What amount of space will be needed? How many people will be employed? Where should the pharmacy be located

and why? How much storage space will be needed? What type of equipment will be required? The type of plumbing, lighting, heating, ventilation, etc. The staff of the Division worked with physicians, hospital architects, administrators, engineers, pharmacists, manufacturers and others throughout the country. This freely given counsel and experience helped greatly in the preparation of this material. The Division of Hospital Pharmacy of the American Pharmaceutical Association and the AMERICAN SOCIETY OF HOSPITAL PHARMACISTS gave us valuable assistance.

The acceptance of these plans is best illustrated by Dr. Don E. Francke, past president of the American Pharmaceutical Association, when in an editorial in the May-June 1950 issue of THE BULLETIN OF THE AMERICAN SOCIETY OF HOSPITAL PHARMACISTS, he said:

> A fundamental contribution to the advancement of hospital pharmacy and better pharmaceutical service to the patient has been made by the United States Public Health Service through its development of floor plans for pharmacies in 50, 100 and 200 bed hospitals. We take pride in presenting these plans prepared by the Division of Hospital Facilities of the Public Health Service. These plans have been studied and approved by the Division of Hospital Pharmacy of the American Pharmaceutical Association and the AMERICAN SOCIETY OF HOSPITAL PHARMACISTS. Thus, in a measure they represent a cooperative project, and we say this not for the purpose of minimizing or attempting to share the credit due to the Public Health Service, but rather to indicate and to emphasize the cooperative manner in which they were developed. Thus, the final plans represent the composite thinking not only of specialists in the Public Health Service, but also of those in hospital pharmacy and in hospital administration. This objective and cooperative approach has resulted in the consideration of the views and judgment of all concerned with the final utilization of these plans.

The development of plans for any segment of a hospital or related health facility is just the beginning since modern medical care is not static. Continual research and study of improved methods is essential. In keeping with this our Pharmacy Specialists are conducting Programming and Planning Seminars through the country for hospital architects, administrators, engineers, pharmacists, equipment manufacturers and others. We believe that understanding of the functions, layout and equipment of hospital pharmacy departments is essential in providing better pharmaceutical service to patients. Undoubtedly, better patient care throughout the country is being influenced by adherence to sound architectural practices in the programming and design of functionally sound facilities. Pharmacy facilities have taken its rightful place in this respect and it will continue to do so.

Professional Service

To lead you to believe that a well planned hospital with all adjunct services necessary to assist the physician in the diagnosis and treatment of illness is the final answer to good medical care to patients would be wrong. The existence of a fine physical facility should never be a substitute for adequate training and skill in all professions. No longer are the duties of the hospital pharmacist confined to compounding and dispensing drugs and pharmaceuticals. As a member of the professional team he renders a professional service to the patient, medical staff and the hospital. To assist the pharmacist in carrying out these services the AMERICAN SOCIETY OF HOSPITAL PHARMACISTS developed a *Minimum Standard for Pharmacies in Hospitals.* The standard has been approved by the Division of Hospital Pharmacy of the American Pharmaceutical Association, American Hospital Association, American Medical Association, and the Catholic Hospital Association. The standard is not an attempt to cast all hospital pharmacies into a single mold, for it is well recognized that each hospital must necessarily vary its methods, space and facilities to meet the needs of its own patients. Through these efforts, however, there has been evolved a standard which, when properly interpreted in the light of the requirements of the individual organizations, may serve as a set of fundamental principles on which to build more efficient and effective pharmaceutical service for hospitals.

Minimum Standard

The *Minimum Standard* consists of six major divisions dealing with organization, policies, personnel, facilities, responsibilities, and the Pharmacy and Therapeutics Committee. The organizational section emphasizes the importance of establishing the department under the direction of a professionally competent and legally qualified pharmacist. Formulation of policies is considered a joint responsibility of the pharmacist, the hospital administrator and the Pharmacy and Therapeutics Committee. The section on personnel concerns the educational qualifications of the pharmacist-in-charge as well as the additional personnel that may be required for departmental operation. Facilities include such items as adequate space for all departmental activities, refrigeration, storage of narcotics and other pharmaceuticals, bookkeeping, library and filing equipment. Specific information is given with respect to the duties and responsibilities of the hospital pharmacist. The organization of the Pharmacy and Therapeutics Committee is described, as well as its functions in the formulation

of policies, the development and revision of formularies of accepted drugs and the evaluation of clinical data pertaining to drugs and pharmaceuticals requested for hospital use.

The Division of Hospital Facilities of the Public Health Service is proud that members of its staff participated as committee members in the development of this *Standard*. The object of hospital standardization, in all its phases, is to promote the care and welfare of the sick and to give to patients the full benefits of modern medical and hospital service and to this we certainly subscribe.

Study Of Pharmacy Services

Planning guides and standards for hospital pharmacies are not enough. We must not rest on past performance when we consider the tremendous importance of the hospital in our daily lives. A patient is admitted to a hospital every two seconds, a total of more than 10 million admissions annually. Since 1935 the total number of patients admitted to hospitals has more than doubled.

A baby is born in a hospital every 11 seconds, an annual total of two and three quarter million, or about 85 percent of all babies born in the United States. In 1935 only 37 percent of the babies were born in a hospital. Each year almost one out of every eight Americans spend some time in a hospital. Including the other two members of the family of the average patient, as well as the hospital staff and others concerned with supplying services, this means that within a year an extremely large proportion of the population is affected directly or indirectly—physically, emotionally or financially—by the hospital.

It is an interesting fact that in 1950 every man, woman and child in the United States had a $52.00 stake in the actual hospital buildings' value, which totalled almost eight billion dollars. The cost of hospitalizing patients is over three and a half billion dollars a year. Hospitals have been called the nations' fifth largest industry. Approximately 5 percent of the total annual expenditures of hospitals go for pharmaceutical services. This figure (approximately $175,000,000) emphasizes the need for continual research and study of pharmacy services with hospitals. You as manufacturers follow this same principle in your business. Millions of dollars are being expended for research and development of drugs and new methods of treatment; yet relatively little has been spent for basic research, analysis, or evaluation and coordination of methods of efficiency in hospital programs. Such programs must keep pace with the advances in medical science if that science is to be applied effectively. The need still exists for "grants for research, demonstration projects in the field of hospital services."

The profession of pharmacy has much to offer to the field of hospital care. The need for trained hospital administrators is great. Pharmacists, because of their time honored relations with the care of the sick, the prevention of illness and the maintenance of health, have developed attitudes in relationship to patients and people which are akin to that of the medical and nursing professions. Many pharmacists have entered hospital administration and, because of their life habits of service to their fellow men, have done well indeed. There is a need for many more in the administration of the nation's hospitals.

Increase in Hospital Pharmacies

In closing it might be well to summarize the progress of pharmacy in hospitals. As late as 1946 only 38 percent of all general non-Federal hospitals had adequate pharmacy departments. The incidence varied from 12 percent in hospitals under 50 beds, 29 percent in hospitals from 50 to 100 beds, 73 percent in those with 100 to 250 beds, to 96 in hospitals with more than 250 beds. It can be graphically shown that there is no question that the development of planning guides and standards by the Public Health Service and the professional pharmaceutical associations have had a tremendous effect on hospital pharmacies. A full realization of the effect on hospital pharmacy may be noted by looking back a few years at the manner in which plans for hospital pharmacies were developed. With a few notable exceptions, the pharmacy was poorly designed, allotted inadequate space, unfortunately located and ill equipped. This had several undesirable results. It stifled the development of hospital pharmacy and limited its expansion, discouraging initiative and progressiveness of those practicing in this specialty. Fortunately, those days are behind us. Hospitals now undergoing construction and expansion as well as those to be built in the future will have pharmacies that bear little resemblance to those of the past. It is my belief that within the next few years pharmacies will be found in nearly all hospitals with 100 beds and over, and in an appreciable proportion of the smaller hospitals. I know the quality of the pharmaceutical services have and are being improved. Much of this is due to the fine programs of development of research in drugs and their use by the pharmaceutical manufacturers of this country. To you we all owe much. Yet there remains much to be done. Our current shortage of 880,000 beds must be reduced in order that those in need may receive the services which will maintain them and our Nation at a high level of good health.

PYROGENS

and the hospital pharmacist

by W. Howard Hassler, Treva Chumley,
Harold Tracy *and* Barbara Vance

The hospital pharmacist who manufactures parenteral solutions is well aware of pyrogens. Too often when a parenteral solution is administered to a patient and he suffers an untoward reaction, the first cry is pyrogens. The pharmacist who prepares his own solutions has no defense against this charge unless he has carried out the U.S.P. pyrogen test on his finished products. In this article we are hoping to show the ease and accuracy of this test and encourage those hospital pharmacists who make solutions to carry out this official test. Not only would it be a safeguard to the patients but it would also add to the prestige and professional skill of the pharmacist. Once your solutions had been proven to be pyrogen-free they would be labeled as such and you would have your test data to support your label.

There is still much to be discovered about pyrogens, for example, the chemical composition has not been definitely established.[1] Pyrogens are probably by-products of bacterial growth, possibly of metabolism. They were at first believed to be protein-like substances, but experiments now indicate that they are probably not proteins but more likely complex polysaccharides apparently linked to another radical containing phosphorus and nitrogen and closely related to bacterial antigens since they show many similar chemical reactions.[2-6]

There is one definite fact established about pyrogens, and that is, they occur only in media which have been contaminated with bacteria. Regardless of the skill and care used in manufacturing parenteral solutions, there is no definite way of knowing that the solution is pyrogen-free unless the hospital pharmacist uses his skill and professional knowledge to perform a pyrogen test.

W. Howard Hassler is an instructor at the University of Tennessee School of Pharmacy and chief pharmacist at the West Tennessee Tuberculosis Hospital, Memphis, Tenn.; and Treva Chumley, Harold Tracy and Barbara Vance are senior pharmacy students at the University of Tennessee School of Pharmacy.

Pyrogen Test

In a recent list of problems of special interest released by the American Society of Hospital Pharmacists, the feasibility of a hospital pharmacy-managed program for pyrogen testing in the hospital was mentioned.

In order to evaluate the possibility of those hospital pharmacists who make their parenteral solutions carrying out such a program we have attempted to carry out a series of pyrogen tests evaluating the time consumed, and effectiveness of such tests.

Three senior pharmacy students who had special interest in hospital pharmacy were chosen to conduct these tests, representing a group of hospital pharmacists with no special training in biological testing.

The tests were conducted according to the U.S.P. directions.* The preliminary charting of the rabbit's normal temperature required eight hours. These tests were done using a B-D rectal thermometer which had been calibrated and found to be correct to 0.1 degree. The chance for error in this procedure is failure to insert the thermometer into the rectum past the internal spincter. When using rabbits which weigh approximately 2500 grams, the thermometer should be inserted about 2½ inches into the rectal canal. The thermometer reading should be taken before the thermometer is removed from the rectum.

The exact procedure for the pyrogen test was as follows: The rabbit was placed on its back and with one person holding the animal another

*See *United States Pharmacopeia* XIV, page 744.

person inserted the thermometer, previously lubricated with a water-soluble lubricant. The reading was taken two minutes after insertion and while the thermometer was in the rectal cavity, the thermometer was removed and the animal released; the animal was then placed on a board approximately three feet long and one foot wide. The animal was placed on its back and its feet tied to each side of the board using gauze strips to prevent binding or stopping of circulation; the ear was washed with sterile saline and the solution to be tested, previously warmed to 37 degrees Centigrade, injected into the marginal ear vein using a 30 cc. syringe and a 22 gauge needle. The injection rate was approximately 2 cc. per minute. During the injection one person must hold the rabbit's head so the needle will not be jerked from the vein; after the injection the rabbit was released and placed in the cage. The animal's temperature was then recorded every hour for three hours as previously described.

In order to establish the accuracy of the pyrogen test, a known pyrogen solution was injected in the first experiment to evaluate the animal's response. Fresh distilled water was collected and made isotonic with sodium chloride C.P. grade. This saline solution was allowed to stand in an open erlenmeyer flask for two days in order that the solution would become contaminated with airborne bacteria and develop pyrogens. The solution was then passed through a sterile Berkefeld filter to free the solution of any bacteria. The following chart shows the animal response when the pyrogen solution was injected:

TABLE I. TEMPERATURE VARIATION UPON INJECTION OF PYROGENIC SOLUTION

ANIMAL	NORMAL TEMP.*	TEMP. 1 HR. AFTER INJ.	TEMP. 2 HRS. AFTER INJ.	TEMP. 3 HRS. AFTER INJ.	AV. TEMP. AFTER INJ.	INCREASE OVER NORMAL
No. 1	102.8	105.1	105.1	106.0	105.4	2.6
No. 2	103.2	105.2	104.1	104.1	104.5	1.3
No. 3	102.4	103.7	103.7	104.1	103.9	1.5

*Temperature readings on Fahrenheit thermometer.

The second experiment was performed in order to show the animal response when a pyrogen-free saline solution was injected. In this experiment a commercial saline product was used which was labeled "pyrogen-free." As noted in Table II there were no untoward reactions when this solution was injected thus proving that the reaction recorded in Table I was due to pyrogens.

TABLE II. TEMPERATURE VARIATION UPON INJECTION OF PYROGEN-FREE SOLUTION

ANIMAL	NORMAL TEMP.*	TEMP. 1 HR. AFTER INJ.	TEMP. 2 HRS. AFTER INJ.	TEMP. 3 HRS. AFTER INJ.	AV. TEMP. AFTER INJ.	INCREASE OVER NORMAL
No. 1	103.2	103.00	103.00	103.2	103.1	-0.1
No. 2	103.2	102.4	103.0	103.2	102.9	-0.3
No. 3	102.4	102.3	102.3	102.4	102.3	-0.1

*Temperature readings on Fahrenheit thermometer.

Summary

1. The U.S.P. pyrogen test can be accurately conducted by a group having little previous experience in biological assay.

2. Once the animal's normal temperature has been established, a pyrogen test may be conducted by two people in 90 minutes total time.

3. The animals may be used repeatedly if allowed a 48 hour rest between tests.

4. Tests are sensitive enough to be detectable by those trained in only the basic pharmacy courses.

BIBLIOGRAPHY

1. Demers, J. U.: *Canadian Pharm. J.* 83:322 (1950).
2. Morgan, W. T. J.: *J. Biochem.* 31:2003 (1937).
3. Topley, W. W. C., Raistock, H., *et al. Lancet* 1:252 (1937).
4. Henderson, D. W., and Morgan, W. T. J.: *Brit. J. Exptl. Path.* 19:82 (1938).
5. Morgan, H. R., *Proc. Soc. Exptl. Biol. Med.:* 43:529 (1940).
6. Walker, J.: *Biochem. J.* 34:325 (1940).

Considerations in the Preparation of PARENTERAL SOLUTIONS

A Case Study

by FRANK L. LARSEN

THE INTRODUCTION of parenteral therapy is generally credited to Richard Lower, who used it in 1665 in Oxford, England. The word "parenteral"[1] is derived from the Greek meaning "other than the intestinal tract," and the term parenteral therapy is most generally applied to the method of administering fluids through veins.

Most hospitals have at some time been encouraged to consider objectively the advisability of manufacturing their parenteral solutions instead of purchasing commercially prepared products. The comparison of these two methods is accentuated by the increased use of intravenous fluids in the face of rising costs for the commercially prepared solutions.

It is both difficult and unwise to state categorically that a hospital should or should not manufacture its own solutions without considering the many factors necessary to a successful manufacturing program. Some of the most important factors include desirable space, cooperation of dependable personnel and, above all, adequate equipment and controls to produce pyrogen-free sterile solutions.

In an effort to place the study on a practical basis, the main purpose of this paper will be to consider the specific factors in relation to space, personnel, equipment, etc., necessary for The Delaware Hospital of Wilmington, Delaware to manufacture its parenteral solutions which are presently being purchased directly from a reputable pharmaceutical manufacturer.

This paper will be limited to a study of large volume parenteral solutions only, in order to simplify the comparison of cost figures. However, the recommended equipment can readily be used to manufacture small volume solutions.

Principal Consideration

Can The Delaware Hospital, Incorporated, of Wilmington, Delaware, manufacture its own parenteral solutions in a professionally and economically sound manner as opposed to the present method of purchasing such solutions from an established vendor?

Basic to the consideration is the use of aseptic techniques which will result in pyrogen-free, sterile solutions so verified by the application of pyrogen and sterility tests as performed by commercial solution manufacturers.

Manufacturing and Storage Area

The Delaware Hospital, which is a 377 bed voluntary general hospital, has available rooms readily adaptable to a parenteral solutions manu-

FRANK L. LARSEN, former graduate student in hospital administration, is now an administrative assistant at The Delaware Hospital, Wilmington, Del.

Adapted from a Thesis submitted through the Graduate School of Public Health of the University of Pittsburgh in partial fulfillment of the requirements for the degree of Master of Science.

facturing and storage area. These adjoining rooms are located one floor below the street level in a clean area where there is little traffic. See accompanying floor plan.

Each of the rooms has approximately 225 square feet of floor space. All walls are glazed tile from floor to ceiling. Both rooms are equipped with floor drains. Hot and cold water plus steam are readily available. The north room is equipped with an unused 42″ x 54″ x 96″ rectangular sterilizer which is in excellent operating condition.

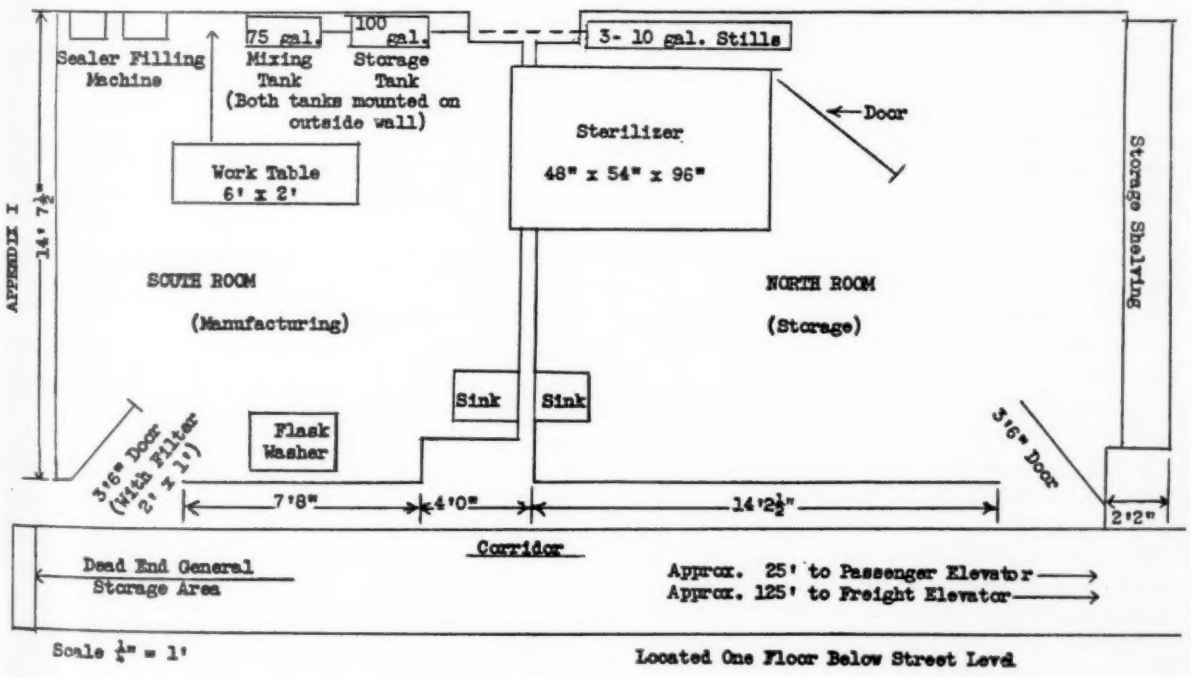
Equipment

Glass Washing Machine. It is essential that glassware which will contain parenteral solutions be thoroughly cleansed with detergent, rinsed with tap water and rinsed finally with pyrogen-free distilled water. The Maintenance Departments of many hospitals have improvised various effective methods for washing glass containers; but there are relatively few glassware machines specifically designed for hospital use.

However, the Heinicke Company of Hollywood, Florida, manufactures a model HW5000 laboratory glassware washer of stainless steel construction. The basic equipment costs $1050, but with an automatic timer, automatic steam thermostat and distilled water booster pump, the total cost is $1540. This Tri-jet unit has separate wash, rinse and distilled water systems with a horizontally oscillating carriage. There is also an automatic detergent dispenser regularly furnished with the unit. The complete cycle takes about one to two minutes.

Special wire racks, which are 12½″ square outside dimension, can be purchased for all types of laboratory glassware. Since it is so vital that solution bottles be thoroughly rinsed with distilled water any machine which will assure automatic and constant rinsing of every bottle is worth consideration. By utilizing racks especially designed for the bottles used, much time and labor can be saved.

Still. The following quotation pertinent to distilled water is extracted from the Fenwal Technical Manual:[2]



Suggested Floor Plan for Solution Rooms, The Delaware Hospital, Wilmington, Del.

The quality of freshly distilled water is affected by two factors, one the design of the still and the other the care and intelligence with which it is maintained and operated. Because those entrusted with the maintenance and operation of the still often have little concept of how distillation is accomplished or what precautions must be taken to obtain pure distillate, various protective features have been incorporated in the design of stills. Singly distilled water is sufficiently pure for intravenous work unless the water supply is unusually bad or the personnel is unreliable or shifted so often that no one is familiar with the still. Double distillation provides a safety factor in such instances because faulty adjustment of the steam or water supply, failure to clean the generator, or operation beyond the normal capacity of the still are not so likely to result in pollution of the final distillate. The source of heat should be accurately controlled to insure constant heat input.

Weeden B. Underwood[3] states that water from a triple but dirty still is potentially more dangerous than water from a single clean still. Because of the excellent baffling system in most stills, ordinary regular cleaning of the coils, etc. will assure delivery of a distillate of unusual purity. Most manufacturers of stills suggest smaller capacity models, usually ten gallons of distillate per hour, so that the user will be encouraged to regularly service the one still while one or more other similar stills remain in operation.

At first glance, it appears unwise to purchase three stills plus a large storage tank, which will be utilized only a half day each week. However, it is anticipated that there will be an increased consumption of parenteral solutions; also these stills will undoubtedly be used on other days for manufacturing various irrigating solutions which are now being prepared in the Central Sterile Supply Department. The experience of most hospitals in the past has been that they underestimated their needs for distilled water, thereby making it difficult to produce sizeable quantities of finished products in a reasonable period of time.

The type still proposed for use will produce 10 gallons of distillate per hour, containing less than 1.5 parts per million total solids. Like most efficient stills, it will have many features to insure proper functioning, such as, automatic pressure, reducing and regulator valves on both the water supply and steam lines. All interior surfaces are hot dipped, pure block tin.

The need for three 10 gallon per hour stills was calculated as follows: Our sterilizer has a maximum capacity of five hundred and forty 1000 cc. Wheaton containers. A total of 188 gallons of distilled water will be necessary for the entire operation. This is based on filling five hundred and forty 1000 cc. containers, including the customary five percent over-fill, plus an average of 260 cc. of distilled water for each bottle for rinsing of bottles, bushings, and vent tubes.

1050 cc. (Includes 5% overfill) x 540 = 567,000 cc.
260 cc. (Distilled water rinse) x 540 = 140,400 cc.
707,400 cc.

$$\frac{707{,}400}{3785} \text{ (cc. in one gallon)} = 188 \text{ gallons}$$

Since three 10 gallon per hour stills furnish 30 gallons per hour (assuming optimum efficiency) or 180 gallons in six hours, an entire week's supply of parenteral solutions can be produced in one working day. Again, emphasis is placed on the added safety factor achieved by using freshly distilled water within a very few hours after distillation.

It is possible to purchase one 30 gallon per hour still at a price almost $700 less than three 10 gallon stills. However, in the event of a breakdown of the still there would be no alternate source of water. Despite the low cost, it seems unwise to risk the possibility of complete loss of solution production.

Also, it is possible to purchase one 20 gallon plus one 10 gallon still, but the advantage in interchange of coils in maintaining the stills is lost when two different sizes are used. The price of this combination of a 20 gallon and 10 gallon would be about $250 less than three ten gallon stills. Therefore, it seems wise to purchase three 10 gallon per hour stills which have complete interchangeability of coils in the event of breakdown.

The three stills will be recessed in the adjoining room where the sterilizer is located, thereby keeping unnecessary heat out of the manufacturing area.

The three 10 gallon per hour stills proposed will cost approximately $2100 including a 100 gallon stainless steel storage tank.

Storage Tank. One main objection to the use of the conventional Fenwal System in the proposed Delaware Hospital manufacturing program is that too many Pyrex storage bottles would be needed to give the quantity of water required in the space of three to four hours. We propose to mount a 100 gallon stainless steel (or block tin coated) storage tank inside the manufacturing room.

The tank will be drained completely after each day's operation to safeguard against bacterial and pyrogenic growth. To insure proper drainage of the tank, it will have a pitched bottom. Also, there will be a closed top with an air filter to prevent possible contamination from the air. The conventional water gauge glass will be omitted since it is difficult to keep clean; hence a source of pyrogenic growth.

Mixing Tank. A 75 gallon stainless steel mixing tank will be mounted next to the storage tank on the outside wall of the manufacturing room. The cost of the closed top tank, including a sealed mixer unit, will be approximately $395.

Work Counter. The chief pharmacist of The Delaware Hospital recommends a 2′ x 6′ soapstone work counter to be located in the manufacturing room. Total costs, including storage shelves below, are estimated at $150.

Filter Unit. In 1936, Co Tui stressed that in preparation of parenteral solutions it was not sufficient to be certain of pyrogen-free distilled water, since very often chemicals are also found to be contaminated. Co Tui recommends that bulk mixtures of distilled water and the chemical be filtered through special asbestos pads designed to adsorb pyrogenic material. However, this type filtering is a slow process and ceases to be effective if the adsorptive filters have reached their retaining capacity. It is difficult to recognize readily when the pads have passed their maximum efficiency; thus making them unsafe for use.

The Fenwal System uses a fritted glass filter designed primarily for vacuum filtration. A concentrated solution is filtered into a volumetric flask and then, by means of burettes, is diluted with distilled water to the proper final concentration. This well-known system is effective; however, many pharmacists prefer mass filtration and bulk dilution of solutions. If solutions are manufactured at The Delaware Hospital a pharmacist will personally mix the chemicals, which should assure accuracy in the mixing process.

The Selas Company of Philadelphia manufactures a pressure filter utilizing a micro-porous porcelain filter element. This bacterial filter has a stainless steel housing which can be installed in the line immediately preceding the filling apparatus. The filter element can be readily removed by disconnecting the hand tightened union connection. The entire unit, completely assembled, can be autoclaved for sterilization.

The Selas Company recommends a .015 porosity filter for parenteral solutions which has a maximum pore size of 1.4 microns radius with a ⅛″ wall thickness. The cost would approximate $100.

Modification of the flow rate can be readily made by increasing or decreasing the total filter area. It is the plan of The Delaware Hospital to filter up to three hundred 1000 cc. units in approximately one hour.

Filling Machine. The United States Bottler Machinery Company manufactures a compact portable semi-automatic vacuum bottle filler. Approximately three hundred 1000 cc. containers can be filled in one hour. Operation of the machine is simple: Two containers are placed in the front holders; the foot lever is pressed down permitting the containers to be revolved into position for filling. The foot lever is then raised slowly thereby allowing containers to engage the filling units. The instant containers contact the sealer rubbers, a vacuum is drawn and filling proceeds while two more containers are placed in the other two holders.

An accurate quantity is assured for each container with quick adaptation for capacity. By adjusting the vacuum the speed of flow into the containers can be regulated according to the consistency of the liquid and proper timing of the operating cycle. The price of the Model B2 machine is $475.

Sealing Machine. One of the features of the Fenwal container is the practically indestructible stainless steel stopper which when removed permits easy insertion of the combined Murphy drip and vent tube. The cost of this seal is $1.50 each plus 42 cents for the bushing with which it is used.

An aluminum seal which would be used on the 1000 cc. Wheaton bottle costs a little less than 3 cents each, but the annual cost to The Delaware Hospital for the seals, disposable bushings, bail bands, and wire hangers, would be $2135, since these items are not reusable. This seal gives the bottle a professional appearance and the assurance to the user that the container has not been tampered with.

The sealing machine required for the closure of this aluminum seal would cost $495 plus $30 for an adjustable chuck. The T. C. Wheaton Company of Millville, New Jersey is the manufacturer. Like many other equipment items recommended for the manufacturing room, this sealer can be adapted for sealing numerous other pharmaceuticals.

Purity Meter. The quality of distillate produced by a still can be readily checked by means of a purity meter. The purity meter consists of a compact electrical conductivity bridge that indicates the purity of distilled water on a scale calibrated from 0 to 15 parts per million ionizable impurities in terms of sodium chloride. One part per million of chloride ion will increase the conductivity of distilled water about 50 percent.[4]

When electrolytes are present in distilled water it can be assumed pyrogenic substances are present. The *United States Pharmacopeia*[5] states that it is safe to use distilled water that contains solids up to twenty parts per million; however, in prac-

tice, as a safety factor, distillate containing more than two parts per million is discarded. Although it is known that pyrogens are a product of many types of bacterial growth as a result of contamination, it is impossible to detect their presence with a conductivity meter.

A purity meter is merely a gross check on contamination since pyrogens are not destroyed by distillation and routine bacterial filtration. The only positive way to determine the presence of pyrogens is by biological means.

Sterilizer. The Delaware Hospital has available in its present solutions storage room an unused 42″ x 54″ x 96″ rectangular sterilizer. This sterilizer has a capacity for five hundred and forty 1000 cc. Wheaton bottles or three hundred and thirty-six 1000 cc. Pyrex Fenwal System containers. By using the Wheaton bottle, the weekly needs of The Delaware Hospital, which averaged 385 units per week in 1951, can be met by manufacturing once weekly. It appears likely that there will be periods when weekly manufacture of solutions can be changed to a bi-weekly basis.

Recording Thermometer. It will be necessary to equip the sterilizer with an automatic recording thermometer and chart which will cost approximately $160.

Storage Shelves. The entire north wall of the storage room will be equipped with metal shelves at a cost of $230. These shelves will have a capacity of approximately 1000 one liter containers, extending twelve feet wide and six and one-half feet high. Flasks will be stacked four deep. Storage on these shelves will represent about a three weeks' supply.

Supplies

Glass Containers. The *United States Pharmacopeia,* Fourteenth Edition, has established four sets of quality standards in which glass is graded Types I, II, III and IV.

In general, Type I is a borosilicate glass of low alkali content which meets the standards for solutions to be introduced into veins. If a glass has a high alkali content the distilled water causes liberation of free alkali, which in turn more vigorously attacks the glass surface.

It is imperative in the preparation of parenteral solutions that when the solutions are administered to a patient they are exactly as originally prepared and that no chemical reaction has taken place between the interior of the glass and the solution.

In 1933 Dr. Carl Walter[6] developed at the Peter Bent Brigham Hospital a technique for hospital manufacture of parenteral solutions commonly known as the Fenwal System. The Fenwal container is pear-shaped, mold blown of thick Pyrex brand chemical glass. This Pyrex container is used almost exclusively by all hospitals which manufacture their own solutions. One of the disadvantages of the Fenwal bottle is the high cost. The current cost is $1.34 per 1000 cc. bottle in purchases of 24 or more. The T. C. Wheaton Company[7] of Millville, New Jersey manufactures a sturdy Type I glass highly resistant to thermal and mechanical shock and to the corroding action of distilled water and aqueous solutions of acids, bases and salts. The trade name for this borosilicate glass is No-Sol-Vit. Since the unit price for 1000 cc. Wheaton containers is only 25 cents per bottle in gross lots, it is worthy of consideration for packaging of hospital solutions.

The American Sterilizer Company of Erie, Pennsylvania now has in production a square-shaped glass baked container very similar to the Pyrex bottle used in the Fenwal System. The bottom of each bottle is equipped with a stainless steel hanger which can readily be hooked to an intravenous standard. The bottle will sell for approximately 95 cents. One of the features of this bottle is a special Neoprene bushing, which fits over the top of the bottle. This bushing, together with a plastic-like cap, has a special vent which permits the air to be driven out of the container during sterilization, then automatically seals itself, producing a 29″ negative pressure. The same type vacuum is produced in the Fenwal bottle, except it is necessary in the latter to press down the stainless steel cap immediately when the flask is removed from the sterilizer.

Much stress has been made on the importance of the Pyrex or Pyrex-like containers because of their ability to withstand great thermal and mechanical shock. However, it is questionable if such a differential in price is justified for hospital manufacture of solutions. One of the main features of any Pyrex glass is its ability to withstand direct application of flame because of its low coefficient of expansion. Since a solution bottle, during sterilization, is subject to a uniform rate of heat, the special thermal quality of a Pyrex container appears unwarranted. In a recent experiment at the Jefferson Medical College Hospital in Philadelphia, approximately four hundred 20 minute sterilizations at 250 degrees Fahrenheit of the Wheaton Type I glass were performed successfully on containers which were stoppered and closed with an aluminum seal. To prove the strength of these bottles, the sterilizer was exhausted immediately. This upsets the pressure equilibrium between the steam chamber and the container, causing the solution to boil, which in turn creates a pressure possibly great enough to explode the bottle.

The proponents of the Fenwal and American Sterilizer systems make special note of the fact that because of the 29″ negative pressure created within the bottle, they can obtain a water hammer by striking one end of the bottle, indicating they have a hermetic seal, intimating the solution is sterile. This is not necessarily true, even though a vacuum exists, but it does prove the bottle has not been tampered with since the time of sterilization.

One criticism made concerning the sterilization of bottles that have been pre-sealed is that when they are taken out of the sterilizer immediately and accidentally jarred, the bottles will explode because of the pressure created within the bottle. In the first place, the sterilizer can be cooled down more gradually since it is unnecessary to make immediate closure of a stainless steel cap as required in the Fenwal System. After the bottles have cooled to room temperature, the pressure in the bottle is no greater than when the bottle was originally filled. Also, by sealing the bottles beforehand it eliminates the necessity of immediately removing heated glassware from the sterilizer. There will be very few solutions made in The Delaware Hospital of such heat sensitivity as to require sudden withdrawal from the sterilizer. In most instances, the solutions can cool gradually, without rapid exhaustion of the steam chamber, with no change in the chemical content.

Since the average weekly parenteral solution needs of The Delaware Hospital can be met by sterilizing once weekly, there will be no need to quickly withdraw the solutions from the sterilizer.

It is recommended that The Delaware Hospital use the Wheaton container for three main reasons. First, the glass meets the requirements of the *United States Pharmacopeia*. Second, because of the smaller height and diameter of the flask it is possible to autoclave more than an average week's supply in one run. Third, the initial cost and normal breakage cost is less than any other container which was considered in this study.

Chemicals. Chemicals are usually of four grades:

Technical	— Cheapest grade
U.S.P.	— Fit for humans
C.P.	— Chemically pure
Reagent (or analytical)	— Laboratory use

The following quotation qualifies the above classification:[8]

> An alert pharmacist will remember that C.P. chemicals do not necessarily meet the rigid standards of the *United States Pharmacopeia* chemicals; furthermore, the term 'chemically pure,' is only as good as the reputation of the firm which uses it. A rigid policy of purchasing chemicals . . . from only the most reputable source can by-pass many pharmaceutical headaches.

The annual costs of Certified Pure grade chemicals, based on a total of twenty thousand 1000 cc. units (fourteen thousand 5 percent, five thousand 10 percent dextrose; one thousand sodium chloride) will be approximately $362.50.

Intravenous Sets

The Delaware Hospital plans to continue purchasing disposable administration sets during the initial months of proposed manufacturing. However, there is no doubt that once sufficient stocks have been established the manufacturing department can assemble its own infusion units resulting in additional savings.

It is estimated that the 9400 sets purchased annually at a cost of 50 cents each can be replaced with comparable materials at a cost of 30 cents per unit. This would be an annual savings of approximately $2800. Contemplated savings on intravenous sets are not included in the minimum annual savings of $6707.59. (See Cost Comparison Chart)

Personnel

As stated previously, it is anticipated that because of the recommended equipment and the unusually large capacity of the existing sterilizer it will be possible for two employees to do all the washing and filling of the average weekly needs of 385 containers in a total of 10 man hours at $1.00 per hour. Although the actual work necessary of the pharmacist can readily be done in one-half hour, it is assumed that the pharmacist will spend four hours daily, when solutions are manufactured, chiefly in a supervisory capacity. Quarterly purchase of bulk chemicals will be made by the pharmacist. The amount of time required for these purchases is insignificant, but is included under Salaries—Pharmacist in the tabulation of annual costs.

Previously it was pointed out that personnel will not be necessary for testing since it is recommended that testing be done by a commercial laboratory.

Testing

Dr. R. O. Muether in *Hospital Progress* of October, 1949 states the symptoms of pyrogenic reactions:

> The reaction usually begins with a chill and in mild reaction no fever develops but in more severe cases the chill is followed by a sharp rise in temperature which may reach 105°F. in a few minutes. The fever usually subsides in a hour or two and rarely lasts four to six hours.
>
> The fever is associated with severe malaise, prostration, headache, and backache. Nausea and vomiting may be troublesome symptoms. The skin is flushed and vascular tone and blood pressure is well maintained. The symptoms can be relieved by administration of morphine sulfate and the intravenous use of calcium gluconate.

Pyrogenic reactions are usually not particularly harmful unless the patient is seriously ill or debilitated. Nevertheless every effort should be made to spare patients this discomfort.

A supply of pyrogen-free distilled water is mandatory if parenteral solutions are to be prepared safely. Many articles have been written concerning aseptic techniques necessary to produce a solution that will have no adverse effect on the patient when injected into the vein. However, experimentation has proven the source of febrile reactions peculiar to intravenous injections has been pyrogen contamination. It is evident that if no bacterial contamination exists the course of pyrogenic growth is eliminated.

In 1911 Wechselmann[9] discovered that the use of freshly distilled water in preparing Salvarsan injections eliminated the chills and fevers which had always been closely associated with such injections.

Hort and Penfold,[10] also in 1911, showed that the distilled water properly preserved gave no reaction upon injection while water not properly protected produced fever and also that the reacting substances could not be removed by the original Berkefeld bacterial filter.

Dr. Carl Walter[11] points out that Seibert and her collaborators (1923-27) added additional organisms to the list of 13 types of bacteria which were capable of imparting a pyrogenic property to distilled water. She made three classifications of pyrogens; one, those provoking low fever, two, those causing chills and high fever, and three, those responsible for immediate prostration and death. Pyrogens are probably by-products of bacterial growth.[12]

Experiments now indicate pyrogens are not protein-like, but more likely complex polysaccharides, apparently linked to antigens.[13]

Particle size of pyrogens is between 1 and 50 millimicrons.[14]

Despite these scientific findings some mysticism still exists in the minds of hospital personnel. Sometimes explanations of fevers are attempted by stating injections were administered too hot, too cold, too fast, faulty tubing or undissolved particles.

The *United States Pharmacopeia* gives detailed instructions on the method of conducting the pyrogen test.

One of the prime requisites in manufacturing parenteral solutions is to use the freshly made distillate within as short a period as possible, since pyrogen-free distillate can readily acquire contamination from the air. The *United States Pharmacopeia* permits use of distillate which has been stored overnight providing a temperature is maintained below or above the temperature necessary for bacterial growth. The Delaware Hospital plans to use all distilled water within four to six hours. Rademaker[15] points out that pyrogens are readily soluble in water and that any tubing or needles used in connection with parenteral fluids, if thoroughly rinsed with distilled water and subjected to sterilization within one hour, will show no evidence of pyrogens.

A good portion of this paper has been devoted to the explanation of pyrogens and methods of detecting and eliminating their presence because understanding of pyrogenic contamination is so vital to safe solution production.

It must be remembered that Banks[16] found that pyrogenic water was rendered innocuous by heating it to a temperature of 284 degrees Fahrenheit for 30 minutes. However, the usual period for sterilization of solutions is only 20 minutes at a temperature of 250 degrees Fahrenheit. Excessive heat could readily change the chemical content of many solutions.

By reducing the sterilizer run to once weekly, the cost for pyrogen and sterility tests will be reduced to a relatively low figure. A commercial laboratory has intimated a total cost for both tests will average approximately $20, which would amount to approximately $1040 annually. Despite the fact some hospitals have had excellent results without the safeguard of a pyrogen test on all runs, we propose to have a pyrogen test made on each type solution manufactured. This testing assures us that there has been no break in our aseptic techniques before and during manufacturing of fluids. The lot being tested will be set aside and not used until verification of the absence of pyrogens has been received from the testing laboratory.

Cost Comparison

One of the criticisms of the cost figures of hospitals which manufacture their own solutions is the omission of many indirect, and even direct, costs. This is often true; however, it is equally true that many costs inherent in the purchase of commercial solutions are frequently omitted when costs are compared.

A charge for space occupied for storage of commercial solutions should be considered just as readily as the space utilized for a solutions manufacturing area. (The ordinary Administrative Expense is calculated on the number of personnel assigned. Since no personnel are assigned specifically to the storage area this expense has not been charged against the commercial solutions.) However, it seems only proper to apportion expense to this area for housekeeping, plant operation, maintenance and repair, plus deprecia-

tion on the building. Present storage of the commercial solutions in The Delaware Hospital involves approximately 225 square feet of floor space or 50 per cent of the 450 square feet required by the proposed plan for the manufacture and storage of liquids.

Also included in The Delaware Hospital's calculation of current solution costs is the one and one-half hour of labor required per week to return containers to the vendor. This represents an annual labor charge of approximately $78.

In computing costs for The Delaware Hospital's proposed manufacturing program, as many factors as possible have been included. Proper consideration has been given to the depreciation of equipment. Such indirect costs as administration, housekeeping, plant operation, maintenance and repair and depreciation on building have been included according to accepted accounting principles. (Account classifications are those recommended by the American Hospital Association.)[17]

ANNUAL COST FOR HOSPITAL MANUFACTURE OF
20,000 LITERS OF PARENTERAL SOLUTIONS

SUPPLIES AND SALARIES			
Chemicals (14,000 of 5% Dextrose; 1,000 of 10% Dextrose; 5,000 Sod. Chloride)	$ 362.50		
Detergent (104 lbs. @ 16c)	16.64		
Distilled Water (6,870 gals. @ 1c)	68.70		
Steam (Based on 52 runs)	9.67		
Salaries (10 hours weekly plus 4 hours Pharmacist)	1,011.40		
Glass Containers (Breakage 10%)	75.00		
Pyrogen and Sterility Tests	1,040.00		
Labels	22.00		
Bushings, Aluminum Seals, Bail Bands - disposable	2,136.00		
Total Cost Supplies and Salaries		$ 4,741.91	
CAPITALIZED EQUIPMENT[18]	Orig. Cost	Depreciation	
Glass Washing Machine	(1540)	$ 103.00	
Stills (3) incl. Stge. Tank	(2100)	140.00	
Mixing Tank - 75 gal.	(280)	18.70	
Mixer	(115)	7.70	
Counter	(150)	7.50	
Filter (Selas)	(100)	10.00	
Filling Machine	(475)	31.70	
Sealing Machine and Chuck	(525)	35.00	
Purity Meter Cell	(32)	3.20	
Purity Meter, Purchased 1940, $50			
Sterilizer, Purchased 1940, $6000		300.00	
Recording Thermometer	(160)	8.00	
Storage Shelves	(230)	11.50	
Racks for Glass Washer	(400)	40.00	
	*($6107)		
Depreciation on Equipment		$ 716.30	
Total Direct Operating Costs			$ 5,458.21
INDIRECT PLANT COSTS			
Administrative Expense (Based on Man Hours)	$ 103.88		
Housekeeping, Plant Operation, Maint. and Repairs (Based on Area)	335.63		
Depreciation on Bldg. (Based on Area)	461.00		
Total Indirect Cost		$ 900.51	
Total Direct and Indirect Costs:			$ 6,358.72

* Cost of Equipment to be purchased: $6107.00
Original Glass Supply (300 @ 25c) 750.00
Total $6857.00

The Administrative Expense apportionment is based on the number of man hours necessary to operate the solutions room:

X = Administrative Expense for Solutions Room
$211,334 = Estimated Annual Administrative Expense
.35 = Solution Room Personnel (14 Hours Weekly)
712 = Total Hospital Personnel

$$\frac{X}{\$211,334} = \frac{.35}{712}$$

X = $103.88

The Housekeeping, Plant Operation, Maintenance and Repair Expense is apportioned on floor space:

X = Solution Room Expense
450 = Solution Room Square Footage
347,272 sq. ft. = Total Area of Hospital
$259,009 = 1951 Housekeeping, Plant Operation, Maintenance and Repair Expense

$$X = \frac{(450 \times \$259,009.)}{347,272}$$

X = $335.63

The Depreciation on Building is calculated as follows:

75 Years Estimated Life Rate = 1½ percent
X = Annual Depreciation of Solution Room
$35,580 = Annual Depreciation on Building
450 = Square Feet of Solution Room
347,272 = Square Feet of Hospital

$$X = \frac{\$35,580. \times 450}{347,272}$$

X = $461.00

ANNUAL COST FOR PRESENT COMMERCIAL SOLUTIONS
(Jan. 1, 1951 — Dec. 31, 1951)

1½ Hours weekly labor to return containers to manufacturers at $1.00 per hour	$ 78.00	
1 Hour weekly Purchasing Agent's time	104.00	
Housekeeping, Plant Operation, Maintenance and Repair apportionment for storage area based on 225 sq. ft.	167.81	
Building Depreciation (Based on Storage Area)	230.50	
20,000 Liter Units (14,000 of 5% Dextrose; 1,000 of 10% Dextrose; 5,000 of Sodium Chloride) Includes deduction of usual 25% discount	12,487.00	
Total Cost to Purchase 20,000 Liter Units	$13,067.31	
Total Cost to Manufacture 20,000 Liter Units	6,358.72	
Annual Savings if Manufactured by Hospital		$6,708.59

Average Cost per Liter:

Hospital Manufactured	$0.317
Commercial Source	$0.653

Conclusions

Throughout this paper the importance of pyrogen-free water in the manufacture of safe parenteral solutions has been emphasized. All items of equipment recommended are directed toward the production of sterile pyrogen-free solutions. The recommendations that professional supervision and testing of all products manufactured further insures the preparation of solutions in a professional manner.

Despite the recommendations of many rather expensive and elaborate items of equipment to achieve a product of professional quality, the economies which can be realized by The Delaware Hospital are significant. The average unit cost per liter of solution will approximate 32 cents as opposed to the present unit average cost from a vendor of 65 cents.

The initial outlay of monies to begin this program will be a total of $6857 ($6107 for equipment; $750 for glass containers). This expenditure will be regained in one year, since the minimum annual savings will be approximately $6707. (See preceding Cost Comparison)

The Delaware Hospital has two qualified pharmacists who are thoroughly trained and experienced in the manufacture of parenteral solutions. By purchasing the recommended equipment, the hospital can provide satisfactory solutions at a minimum annual savings of $6700.

By not manufacturing solutions, the hospital not only loses money, but a more significant deficiency is the tendency to inhibit the professional growth of highly trained men. Quite often a physician desires a special solution which usually is not readily available. A pharmacist with a well equipped solutions room could competently fill any such need promptly.

Comparatively little emphasis has been made concerning the minimum annual saving of $6700, since in the interest of better patient care it seems the professional quality of the solutions manufactured is most essential.

In summary, the writer concludes that The Delaware Hospital can manufacture its own large volume parenteral solutions in a professionally and economically sound manner.

Recommendations

In considering the manufacture of parenteral solutions, the main emphasis should be on the following criteria which give evidence that the hospital can consistently produce pyrogen-free solutions:

Efficient supply of pyrogen-free distilled water.

Trained personnel with competent supervision.

One department of the hospital should be solely responsible for the entire program. In smaller hospitals, because of the need to share sterilizer space, etc., careful planning and cooperation can make solutions manufacturing feasible. It is wise if the manufacturing program is geared so that distilled water used will be sterilized within six hours from the time it is prepared. Under no circumstances should the distilled water be held over until the next day, unless provision can be made to prevent bacterial growth.

The manufacturing room should be located in a relatively clean section of the hospital and not be exposed to much traffic.

Pyrogen tests should be regularly performed either by the laboratory of the hospital or a commercial laboratory.

Mechanical devices should be used, where possible, to aid in decreasing the chance for human error. Items such as an automatically controlled washing cycle, bottle filler, timer for sterilizer, etc. are essential.

The question usually asked is: "How large must a hospital be to profitably manufacture parenteral solutions?" On the basis of this study, it seems extremely unwise to attempt to generalize. There is little question regarding the economics of hospital manufacture, since one of the main costs for the commercial manufacturer is a direct problem of shipping; in effect, large quantities of *water,* which can be prepared safely by even the smallest hospital, must be transported great distances by various carriers.

The real question to be answered by any hospital considering solutions production is: "Do we have the space, equipment and personnel cooperation necessary for production of pyrogen-free solutions?"

REFERENCES

1. Dorland, W. A.: *The American Illustrated Medical Dictionary,* W. B. Saunders Co., Philadelphia, Pa., 1950, p. 1068.
2. *Fenwal Technical Manual,* The Macalaster Bicknell Co., 1942, p. 16.
3. Underwood, W. B.: Preparation and Sterilization of Aqueous Solutions, *The Surgical Supervisor,* American Sterilizer Co., (July) 1941.
4. *Fenwal Technical Manual,* The Macalaster Bicknell Co., p. 16.
5. *Pharmacopoeia of the United States, Fourteenth Revision,* Mack Publishing Co., Easton, Pa., 1950.
6. Walter, C. W.: The Relation of Proper Preparation of Solutions for Intravenous Therapy to Febrile Reactions, *Ann. Surg. 112*:603 (Oct.) 1940.
7. *T. C. Wheaton Catalogue YR 63,* T. C. Wheaton Co., Millville, N. J.
8. Francis, Sister M. Clara: Preparation of Parenteral Medications, *Hosp. Progress* 27:308 (Sept.) 1946.
9. Cook, E. F. and Martin, E. W.: *Remington's Practice of Pharmacy,* Tenth Edition, Mack Publishing Co., Easton, Pa., 1951.
10. Hort, E. C. and Penfold, W. J.: *Brit. M. J. 2*:1589, 1911.
11. Walter C. W.: The Basis of Successful Parenteral Therapy, *U. S. Nav. Med. Bull. 39*:249 (Apr.) 1941.
12. Cook, E. F. and Martin, E. W.: *Remington's Practice of Pharmacy,* Tenth Edition, Mack Publishing Co., Easton, Pa., 1951.
13. Probey, T. F. and Pittman, M.: *J. Bact. 50*:397, 1945.
14. Lees, J. C. and Levvy, G. A.: *Brit. M. J. 1*:430 (Mar. 16) 1940.
15. Rademaker, L.: Reactions to Intravenous Administration of Solutions, *J. Am. Med. Assoc. 135*:1140 (Dec. 27) 1947.
16. Banks, H. M.: Study of Hyperpyrexia Reaction Following Intravenous Therapy, *Am. J. Clin. Path. 4*:260 (May) 1934.
17. American Hospital Association: *Handbook on Accounting Statistics and Business Office Procedures for Hospitals,* 1950, Sec. I. p. 109.
18. Ibid: Sec. I, p. 139.
19. Co Tui, F. W. and Wright, A. M.: The Preparation of Nonpyrogenic Infusion and Other Intravenous Fluids by Adsorptive Filtration, *Ann. Surg. 116*:412 (Sept.) 1942.
20. Fay, R. V.: Why We Do Not Manufacture Parenteral Solutions, *Hosp. Management 72*:64 (August) 1951.
21. Godley, A. P. and Godley, L. F.: Organizing the Pharmacy for Preparation of Sterile Medications, *Hospitals 20*:76 (June) 1946.
22. Nesset, N. M. *et al*: Bacterial Pyrogens I. Pyrogenic Preparations from a *Pseudomonas* Species, *J. Am. Pharm. Assoc.* (*Sci. Ed.*) 39:456 (Aug.) 1950.
23. Walter, C. A.: *Aseptic Treatment of Wounds,* The MacMillin Company, New York, 1948, Chapter 16.

ACKNOWLEDGMENTS

The preparation of this thesis on the Manufacture of Parenteral Solutions was greatly facilitated by whole hearted cooperation from the Chief Pharmacist of The Delaware Hospital, J. R. Cathcart. He assisted in evaluating advertising brochures and technical manuals concerned with necessary equipment and supplies needed for the manufacture of parenteral solutions.

The Asa S. Bacon Memorial Library of the American Hospital Association proved an excellent source for literature on the general subject of parenteral solutions.

Much valuable information was furnished by representatives of two commercial manufacturers, Cutter Laboratories, Inc. and Hospital Liquids, Inc.

Representatives of several vendors who sell supplies and equipment necessary for hospital manufacture of solutions freely corresponded and made many personal visits to The Delaware Hospital to discuss equipment features and proposed layouts. These vendors included the American Sterilizer Company, Barnstead Still and Sterilizer Company, Colson-Merriam Company, Macalaster Bicknell Company, and the Wilmot-Castle Company.

THE SUCCINATES

their use and formulation

by JEROME M. YALON

SUCCINIC ACID OR BUTANDIOIC ACID is classed as one of the polybasic carboxylic acids. For the most part these acids are metabolized. Succinic acid has been found to be an intermediary product in the metabolism of carbohydrates in the body. Duncan states[1] that succinic acid may arise from any of these types of foodstuffs—proteins, carbohydrates, or lipids—and enter into the common metabolic stream.

Szent-Gyorgi observed[2] that the respiration of muscle was catalytically increased by the addition of small amounts of either succinic, fumaric, malic or oxaloacetic acid. Krebs enlarged upon these observations to show that all of these acids were involved and it is probable that the Krebs cycle represents the main pathway of oxidation in tissues.[1]

JEROME M. YALON, formerly Chief Pharmacist, is now Assistant Administrator at the University of California Hospital, San Francisco.

Based on this and other observations of the action of succinic acid in the body, research workers began to experiment with this acid as a medicinal agent.

Medicinal Uses

Diabetes. It has been tried in moderating glycosuria, hyperglycemia and ketonuria in diabetes with little success.[3]

Rheumatic Fever. Because rheumatic fever has been shown to interfere with various enzyme systems involved in tissue oxidation the use of succinic acid in the form of the calcium salt in combination with ascorbic acid was tried.[4] The calcium salt was used because calcium has a marked effect on the activity of succinic acid dehydrogenase. The catalytic action of a group of enzymes prepares food for assimilation and subsequent oxidation. One of the enzymes in-

aNOOC-CH₂-CH₂-COONa

Sodium Succinate

volved in biological oxidations and reductions is succinic acid dehydrogenase which activates the oxidation of succinic acid to fumaric acid.[5] The use of ascorbic acid was rational since rheumatic fever produces a reduction of the amount of this acid in the body.

Barbiturate Poisoning. A major finding has been that the oxidation of succinic acid in the body is not greatly affected by the barbiturates, therefore sodium succinate was suggested as an analeptic in barbiturate poisoning.[6] However, the investigators agree that a definite decision as to the value of succinates in barbiturate poisoning is not justifiable at this time. The succinate presumably supplies a substrate aiding cerebral oxygenation processes which are not materially affected by the barbiturates. Barrett, however, states that he has no doubt of the effectiveness of sodium succinate as an analeptic in man and that it is preferable to convulsant drugs in the treatment of barbiturate poisoning.[7,8]

Zuckerbord and Graf concluded that disodium succinate has some anti-barbiturate action with no significant vasodilating action save for the blush areas, and that it should be used with caution where there is evidence or history of heart disease.[9]

Friend and Gold concluded on the basis of their investigation on animals, that the succinate ion is substantially inert with a doubt in their minds as to whether it exerts any specific toxic effects.[10]

Velocity of Blood Flow. Sodium succinate has been suggested as another agent for the estimation of the velocity of blood flow because it meets the requirements of being non-toxic, has no undesirable side effect upon the conditions being studied, minimum unpleasant side effects, rapid elimination and an end point that is easily recognized.[11]

Hepatic Disease. The addition of parenteral cytochrome and oral sodium succinate[12] to a standard regime of therapy in six cases of chronic hepatic disease resulted in histologic evidence of increased hepatic parenchymal cell regeneration. However, the liver function remained unaltered and the investigators did not recommend the treatment on this basis.

Laxatives. Investigations have been carried out on the use of succinic acid, sodium succinate and magnesium succinate in the management of patients with chronic constipation.[13] Preparations containing 5 to 10 grams of the compounds were given in one glass of water followed by a half-glass of water. A laxative action was produced in 75 percent of the cases. No disagreeable side effects were observed except for unpleasant taste.

Multiple Sclerosis. Dr. Robert Aird of the University of California Medical School has recently been working with sodium succinate in multiple sclerosis.[14,15] Multiple sclerosis is a chronic, slow, progressive disease of the central nervous system clinically characterized by multiple symptoms and signs and by remissions and exacerbations. This disease, in two-thirds of the cases, usually shows up between the ages of 20 and 40. The cause is unknown. The disease is rare in warm climates and characterized by spontaneous remissions as long as 25 years. These spontaneous remissions make it difficult to evaluate any form of treatment of the disease. Aird states that the systemic trial of mechanisms which may improve tissue oxygenation in the central nervous system has seemed well justified. As a pilot procedure for the subsequent oral administration of sodium succinate, Dr. Aird injected 20 cc. of a 30 percent solution of this agent at the rate of 4 to 5 cc. at 1 cc. per second, then the balance at a slower rate. The patient coughed at the end of 10 to 15 seconds followed by a crimson flush in the blush areas within ½ to 1½ minutes after the start of the injection. Objective changes observed within minutes were interpreted as physiological changes produced by the injection. Oral dosage was then instituted at the rate of a level teaspoonful (4.5 to 5 grams) in one ounce of water three times daily, then increased in two days to double this dosage. The object was to obtain sustained effect by a simple method which would be practical for the patient on a continuing day to day basis. Approximately 50 to 75 percent of the patients treated have been benefited. Deterioration of the patient's condition was observed upon discontinuance of the treatment with improvement upon resumption. Side effects were reported in four patients, three of whom were able to continue treatment upon reduced dosage. These side effects were marked flushing, urticarial rash, gastrointestinal and genito-urinary irritation.

Potassium Succinate

About six months ago, I was approached by Dr. Aird on the problem of substitution of the

EDITOR'S NOTE: For another view of the use of succinates in barbiturate intoxication, see page 198 of this issue of THE BULLETIN.

potassium ion for the sodium ion in the succinic salt. Many patients could not be given large amounts of sodium ion because of cardiac and other conditions. Since potassium succinate was not obtainable from our chemical suppliers, except on a large volume, special production basis, the following formula was worked out on a pilot plant basis by myself and then turned over to Mr. S. Dean, Jr., and Mr. H. Fifer of our manufacturing laboratory for quantity production:

MONOBASIC POTASSIUM SUCCINATE SYRUP

Succinic Acid	756.40 Gm.
Potassium Hydroxide	358.96 Gm.
Fluid Orange, Lilly	62.31 cc.
Solution Orange No. 1 - 1%	2.50 cc.
Syrup, to make	4000.00 cc.

Dissolve potassium hydroxide in 1282 cc. of water. Add succinic acid. *(Caution: Carry out reaction on ice bath.)* Complete reaction. Add the rest of the ingredients and make up to volume with simple syrup. Note: It may be necessary to apply gentle heat to the reaction mixture after the first reaction has taken place in order to solubilize the mono-potassium succinate in the 1282 cc. of water. The *p*H of the final solution is between 4.5 - 5.0. Mono-potassium succinate content 1.0 gram per 4 cc. Potassium ion content 25 percent approximately.

The dosage used was approximately that of sodium succinate: 4.5 to 5 grams three times daily and after two days the dosage was doubled.

A dibasic potassium succinate syrup was also requested by another service because of its high potassium content. The succinate ion played no important role in this particular use of the compound except that it was a normal by-product of biological oxidation with no apparent toxicity or side effect.

DIBASIC POTASSIUM SUCCINATE SYRUP

Succinic Acid	608.17 Gm.
Potassium Hydroxide	577.25 Gm.
Fluid Orange, Lilly	69.74 cc.
Citric Acid	11.62 Gm.
Amaranth 1% Solution	2.00 cc.
Syrup, to make	4000.00 cc.

Add KOH to 1030 cc of water. Dissolve. Add succinic acid. *Caution: Carry out reaction on ice bath.* Add the rest of the ingredients. The *p*H of the final solution is between 6.6-6.7. Dipotassium succinate content 1.0 gram per 4 cc. Potassium ion content 40 percent approximately.

The granular form of disodium succinate hexahydrate originally used by Dr. Aird was obtained from Mallinckrodt Chemical Works. The injectible form was obtained from Brewer and Co., Inc. under the name of Soduxin, 20 cc. ampuls, 30 percent solution.

A formulation for sodium succinate tablets was developed by our manufacturing laboratory. This dosage form was discontinued because it was found that the granular form, given in teaspoonful dose, was more economical to the patient. For information, however, the formula is as follows:

SODIUM SUCCINATE TABLETS 0.5 GRAM

Disodium Succinate, Hexahydrate Powder, Mkdt.	0.5 Gm.
Starch, Potato	0.1 Gm.

Granulate with 1 percent gelatin solution. Dry overnight and reweigh. Approximate loss 6 percent. (Note: Do not attempt to screen the first time. Merely mass well and dry.) Screen through No. 10 screen and lubricate with 1 percent stearate. Use ½ inch concave die.

Summary

A review of the literature on succinic acid and the succinates is presented indicating the biochemistry and possible uses of these compounds. A new use of the succinates in multiple sclerosis is discussed with reference made to formulations possible.

REFERENCES

1. Duncan, G. G.: *Diseases of Metabolism,* W. B. Saunders Company, Philadelphia, 1947, p. 151.
2. Szent-Gyorgi, A.: *On Oxidation, Fermentation, Vitamins, Health and Disease,* Williams and Wilkins Co., Baltimore, 1939.
3. Duncan, G. G.: *Diseases of Metabolism,* W. B. Saunders Company, Philadelphia, 1947, p. 786.
4. Gubner, R. and Szucs, M.: Therapeutic Measures in Rheumatic Fever, *New England J. Med. 233:*652 (Nov. 29) 1945.
5. Schmidt and Allen: *Fundamentals of Biochemistry.*
6. Brazier, M. A. B., Miles, H. H. W. and Finesinger, J. E.: A Study of Pentothal Sodium Anesthesia and a Critical Investigation of the Use of Succinate as an Antidote, *Anesthesiology 10:*25 (Jan.) 1949.
7. Barrett, R. H.: The Analeptic Effect of Sodium Succinate in Barbiturate Depression in Man, *Anesth. and Analg. 26:*74 and 105 (Mar.-Apr.) (May-June) 1947.
8. Barrettt, R. H.: Sodium Succinate — Clinical Use in Respiration Depression, *Anesth. and Analg. 27:*326 (Nov.-Dec.) 1948.
9. Zuckerbord, M. and Graf, I.: Clinical Evaluation of Disodium Succinate Including a Report on its Ineffectiveness in Two Cases of Severe Barbiturate Poisoning and Some Toxicologic Notes on other Succinate Salts, *Ann. Int. Med. 32:*905 (May) 1950.
10. Friend, V. L. and Gold, H.: A Contribution to the Pharmacology of Succinic Acid and its Sodium and Magnesium Salts, *J. Am. Pharm. Assoc. (Sci. Ed.)* 36:50 (Jan.) 1947.
11. Greenfield, I.: Sodium Succinate as a Test of Circulatory Efficiency, *Ann. Int. Med. 32:*524 (Mar.) 1950.
12. Zelman, S.: Effect of Cytochrome C and Sodium Succinates in Man, *J. Am. Pharm. A. (Sci. Ed.) Am. J. Digest. Dis. 17:*300 (Sept.) 1950.
13. Warshaw, L. J. and Gold, H.: Laxative Action of Succinates in Man, *J. Am. Pharm. Assoc. (Sci. Ed.) 36:*56 (Feb.) 1947.
14. Aird, R. B.: Succinate Therapy in Multiple Schlerosis, *Neurology 1:*219 (May-June) 1951.
15. Aird, R. B.: Personal Communication

Public Health Service Reports on Survey

"KEEPING OUR HOSPITALS OPERATING—A Study of Supply and Equipment Requirements," reports on a survey recently made by the Public Health Service in cooperation with the American Hospital Association. It covers the requirements for maintenance, repair and operating equipment and supplies for the non-Federal hospitals in continental United States. The study came about as a result of the current need for such data in the event of mobilization or any type of emergency. Shortly after the start of the Korean war, the Federal Security Agency (now the Department of Health, Education and Welfare) was designated as a "Claimant Agency" with responsibility for health, education, welfare, recreation and sanitation programs. In carrying out this function, this survey was conducted as one of a series to establish health supply estimated requirements.

Included in the survey were 644 items of which 75 were drug items. Based on the American Hospital Association lists, the non-Federal continental hospitals were divided into classes comprising (a) general and special short-term hospitals, (b) all member hospitals, and (c) other long-term hospitals. These classes were further subdivided into size groups and the survey conducted on a sampling basis. Further, the 644-item list was divided into 25 schedules with about 20-30 items per schedule. Thus, each hospital was not asked to supply information on the entire list, with no hospital requested to complete over two schedules.

According to the introduction of the publication giving results of the survey, a "Schedule" represented a homogeneous collection of supplies or equipment such as drugs, laundry, equipment, surgical instruments, etc. Those schedules relating to equipment with a long life expectancy such as anesthesia or x-ray apparatus requested data on *purchases* for the 5-year period 1947-1951, inclusive. Schedules for less durable items or supplies requested data on quantity *used* for the single year 1951. Drugs were included in the latter category. The specific instructions on these schedules read as follows:

> The purpose of this form is to obtain data which can be used for securing a reliable estimate of the *normal usage* of hospital items for the calendar year 1951. In order to eliminate the influence of varying inventory and procurement practices, the quantities reported in this form should be based upon actual usage rather than upon purchases. For hospitals employing stock control or other inventory and issue control systems, information requested can be obtained from the issue records of such systems. For hospitals which do not have stock control systems or other records showing quantities issued for use, *reasonable estimates* of usage should be made. If estimates are not feasible, data based upon purchases will be acceptable.

Most items included in the Survey were selected on the basis of some potential shortage problem relating to mobilization. In the case of drugs, selection was based on some definite essential use or shortage of the basic drug or its intermediate. Also, consideration was given to products for which the demand is so large that it is important to developing the nature of the hospital demand. There are undoubtedly a number of additional items not included which could have been, but were omitted because the list had to be kept to a minimum in view of budgetary limitations.

This type of study becomes increasingly important in time of defense mobilization, not only in planning ahead for the emergency but also making provision for emergencies which may occur before and after any major disaster. Although hospital pharmacists may not have specific use for such factual data in their day-to-day practice, it is well that they are cognizant of this type of study and be ready to extend cooperation in any sound program which is carried out in the interest of providing information so valuable in defense mobilization. The lack of statistical information on many phases of hospital pharmacy is indicative of the total problem in hospitals. It is also of interest to note that this type of survey provides industry with a tool which can be used in meeting the responsibilities which must be faced in any national emergency.

Among the individuals given special acknowledgment "for planning and direction of survey activities" are several who are closely allied with hospital pharmacy. These are: Thomas A. Foster, Leonard Goudy, Everett W. Jones, Alexander Milne, J. Solon Mordell and Guy H. Trimble.

ASHP

American Society of Hospital Pharmacists

meets with

apha

American Pharmaceutical Association

SALT LAKE CITY

AUGUST 16-24

"This is the Place" Monument—where the Pioneers first entered Salt Lake City.

MEMBERS OF THE AMERICAN SOCIETY OF HOSPITAL PHARMACISTS will convene for their tenth annual meeting being held in conjunction with the American Pharmaceutical Association in Salt Lake City during the week of August 16. An outstanding program is being arranged with participation by hospital pharmacists and leaders in the hospital field as well as in our own profession. Sessions of the AMERICAN SOCIETY OF HOSPITAL PHARMACISTS are scheduled on Monday and Tuesday, August 17 and 18, with the House of Delegates meeting on Sunday, August 16 at 2 P.M. Other affiliated groups of the A.Ph.A. including the Teachers' Conferences of the American Association of Colleges of Pharmacy, the National Association of Boards of Pharmacy, and the American College of Apothecaries will also meet on Monday and Tuesday. The A.Ph.A.'s Sections, the General Sessions and the House of Delegates will continue through Friday. A complete schedule of the meetings is included in the June issue of the *Practical Pharmacy Edition of the A.Ph.A. Journal.* It is hoped that hospital pharmacists will plan to be present for the ASHP House of

Delegates meeting on Sunday and throughout the week for the Association's meetings, as well as those pertaining particularly to hospital pharmacy.

Meetings will be held at the Hotel Utah and a suite will be reserved at the headquarters hotel for hospital pharmacists and their friends. This will offer an opportunity for informal discussions and committee meetings. Since it is not possible for all people attending the convention to stay at the headquarters' hotel, we have found that it is advantageous to have a room available where hospital pharmacists can meet informally.

Plans are also being made by the local hospital pharmacists in Salt Lake City to assist in whatever way possible in connection with the Society's program.

House of Delegates

The ASHP Constitution and By-Laws provides for a House of Delegates made up of representatives of affiliated chapters, the executive committee, and the chairmen of special committees. However, meetings are open to all SOCIETY mem-

Convention Information

A.Ph.A. Convention —
Hotel Utah, Salt Lake City, Aug. 16-21

ASHP House of Delegates —
Sunday, 2 P.M.

ASHP General Sessions —
Monday and Tuesday

ASHP Breakfast —
Tuesday, 8 A.M.

A.Ph.A. Section Meetings —
Wednesday, Thursday and Friday

A.Ph.A. General Sessions —
Wednesday, Thursday and Friday

A.Ph.A. Annual Banquet —
Thursday Night

bers, and we urge all who are attending the convention to take this opportunity to participate in the organizational activities. Although only official delegates may vote, any SOCIETY member may have the privilege of the floor in the House of Delegates. Reports will be received in writing from the various affiliated chapters and any special problems which should be brought to the attention of the national group will be considered here. A special panel discussion is being arranged in order that there will be an opportunity to discuss current problems, future plans for SOCIETY activities, problems in organizing affiliated groups and any other matters of interest to the membership. Should you have suggestions concerning matters which might be considered at this meeting, we shall be glad to hear from you. Also included on the agenda for the House of Delegates meeting will be an address by President-Elect Allen V. R. Beck in which he will outline projected plans for ASHP activity during the coming year.

General Sessions

Mr. Paul Bjerke and other members of the Committee on Program and Public Relations have arranged a program which will be of interest to pharmacists practicing in all types of institutions. Highlighting the meeting will be talks by representatives of each of the hospital associations—the American Hospital Association and the Catholic Hospital Association. Mr. M. R. Kneifl, executive secretary of the C.H.A., will again discuss "Application of the Proposed Point Rating System," which was first presented to the SOCIETY at the 1952 convention. Since that time the Plan has been made available to the local affiliated chapters and other interested groups for further study. At the present time these groups are conducting pilot studies in order to determine the adequacy of the Proposed Plan in evaluating pharmaceutical services. Mr. Kneifl has already submitted the Plan to the Catholic hospitals and it is anticipated that he will report on the results at this meeting.

Dr. Charles Letourneau, secretary of the Council on Professional Practice of the American Hospital Association, will present a paper on "Pharmacists in Today's Hospitals." Dr. Letourneau is well known in the hospital field and has attended recent pharmacy institutes and ASHP meetings.

A panel discussion on "Academic vs Non-Academic Internships," is scheduled for the Monday morning session. The participants will include a representative for hospital administration; a dean of a school of pharmacy; a hospital pharmacist who has conducted a non-academic internship program, as well as one who has participated in such a program; and a hospital pharmacist who has completed an academic internship and received a Master's degree. This timely subject will be of interest to all those practicing since any form of practical training has bearing on the future supply of well-trained hospital pharmacists. The moderator for the panel will be Dr. W. Arthur Purdum, chief pharmacist at The Johns Hopkins Hospital, Baltimore, Md. He has been in charge of an academic internship program, has been active in working out the Proposed Minimum Standard for Pharmacy Internships in Hospitals and is, therefore, well qualified to lead this discussion.

Another panel on "Narcotic Regulations with Emphasis on Problems in Hospitals" will be in charge of Mr. Vernon O. Trygstad, who has served as chairman of the SOCIETY's Committee on Narcotic Regulations during the past year. In line with the report which was presented at the 1952 convention, it is anticipated that the panel discussion will offer an opportunity to determine the thinking of hospital pharmacists on the matter of possible changes in the present narcotic regulations. In order that the various associations concerned will know what is necessary in connection with narcotic regulations in hospitals, it is hoped that those present will be ready to present their views.

Dr. Glenn L. Jenkins, dean of the Purdue University School of Pharmacy, will cover "What the Future Holds for Hospital Pharmacy." It is anticipated that he will discuss the future demands for hospital pharmacists and outline the type of training, both from the academic and practical viewpoints, which will be necessary in order to meet the needs of the pharmacists who are practicing in this specialty. Other papers to be presented are as follows:

"Role of the Hospital Pharmacist in Community Life," Chase Holaday

"The Changing Antibiotic Spectra," Henry W. Beard

"Problems in Providing Adequate Pharmaceutical Service in Small Hospitals," Thomas Foster

"The Formulation of Paraldehyde Suppositories," Harold Sheinaus and Glen J. Sperandio

"Ophthalmic Medication Preparation—Part I," Milton W. Skolaut

"The Basic Drug Program In Operation," J. Solon Mordell

"A Basic Lotion," George Gruber

It is anticipated that special events will be arranged for the hospital pharmacists. In accordance with the tradition established at the first meeting of the ASHP, a breakfast will be held on Tuesday at 8 A.M.

INTERNS *in hospital pharmacy*

Albert W. Kossler

will complete the graduate studies and internship in hospital pharmacy offered as a joint program by the University of Maryland School of Pharmacy and The Johns Hopkins Hospital in June, 1953. He was born in Pittsburgh, Pa. on October 14, 1929, and has been associated with pharmacy most of his life. Mr. Kossler worked in his father's store as an apprentice and has had experience in several retail stores in Pittsburgh. He received his early education in Pittsburgh, and earned a bachelor of science degree from the University of Pittsburgh School of Pharmacy in June, 1951. He is a registered pharmacist in Pennsylvania. His thesis concerns a pricing schedule for hospital pharmacies. He is a member of the American Pharmaceutical Association, **American Society of Hospital Pharmacists**, Maryland Association of Hospital Pharmacists, Rho Chi Honorary Pharmaceutical Society, and Kappa Psi Pharmaceutical Fraternity.

Robert E. Lawson

will complete the joint program of graduate study at the University of Maryland leading to a Master of Science degree and the internship in hospital pharmacy offered by The Johns Hopkins Hospital in June of this year. He was born in Ottawa, Kan. in 1929 and was graduated from a Denver, Colo. high school. He received his bachelor of science degree in pharmacy from the University of Colorado in 1951. He is a member of the American Pharmaceutical Association, the **American Society of Hospital Pharmacists**, the Canadian Society of Hospital Pharmacists and the University of Maryland Biological Society.

Edward Superstine

senior intern at the University of Michigan Hospital, on completion of graduate study and formal internship in hospital pharmacy in June, 1953, will receive the Master of Science degree. Mr. Superstine received his Bachelor of Science degree in Pharmacy from the Detroit Institute of Technology, School of Pharmacy in June, 1949. A native of Michigan, Mr. Superstine was born in Detroit, in 1926. He served as a Pharmacist Mate in the U. S. Navy during World War II. He has had experience in manufacturing and retail pharmacy. Some of his manufacturing experience was obtained while visiting Israel in late '49 and '50, where he worked at the Assia Pharmaceutical Co. Mr. Superstine is married and has a daughter two years old. He is a member of the **American Society of Hospital Pharmacists**, the American Pharmaceutical Association, Michigan Society of Hospital Pharmacists, Rho Chi Honorary Society and Alpha Zeta Omega, pharmaceutical fraternity. As soon as Mr. Superstine completes his work in Ann Arbor he will leave for Durham, North Carolina where he will take up the duties of assistant chief pharmacist, under I. Thomas Reamer at Duke Hospital.

Lawrence Y. W. Wong

will receive a Master of Science degree in pharmacy on completion of the joint program of graduate study and internship in hospital pharmacy offered by the University of Michigan, Horace Rackham Graduate School and the University of Michigan Hospital, in June of this year. A native of Honolulu, Hawaii, Mr. Wong was born in November 1928. Mr. Wong received his Bachelor of Science degree from the University of Michigan College of Pharmacy in June, 1951. He is a registered pharmacist in Michigan and has had pharmaceutical experience in the retail field. While a senior intern, he was a teaching fellow in the University of Michigan. He is a member of Rho Chi Honorary Pharmaceutical Society, The **American Society of Hospital Pharmacists**, The American Pharmaceutical Association, and the Michigan Society of Hospital Pharmacists.

Gene G. Knapp

now a senior intern will graduate with a master of science degree in Pharmacy in February, 1954 from the University of Michigan. His undergraduate work was started at Jackson Junior College and completed at the University of Michigan, where he graduated in June, 1952. He was born in Coldwater, Michigan in November 1930. Mr. Knapp's education at the University Hospital and the University of Michigan has been one of formal internship and graduate study. He also served as a teaching assistant for the University of Michigan College of Pharmacy. He is a member of the American Pharmaceutical Association and the **American Society of Hospital Pharmacists.**

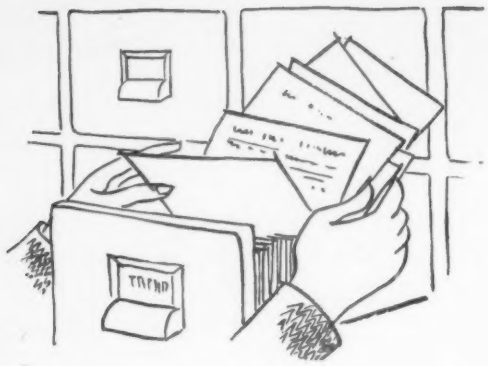
William Zeldis

will complete the internship at the Jefferson Medical College Hospital in June and will receive a master of scienee degree in Pharmacy from the Philadelphia College of Pharmacy and Science. Mr. Zeldis was born in Hartford Connecticut and attended the University of Connecticut College of Pharmacy where he received the Bachelor of Science degree in Pharmacy in June, 1951. In 1950 he was elected a member of Rho Chi Honor Society. He holds membership in the **American Society of Hospital Pharmacists,** the American Pharmaceutical Association, the Connecticut Pharmaceutical Association and the Philadelphia Hospital Pharmacists' Association. He is also a member of Nu Chapter, Alpha Zeta Omega Pharmaceutical Fraternity where he has held the office of president in 1951 and vice-president in 1950.

Robert W. Goettsch

is a candidate for the degree of master of science in Pharmacy from the State University of Iowa in June, 1953. He began the joint program of graduate study and internship in hospital pharmacy shortly after graduating from the College of Pharmacy of the University of Colorado in 1951. He was born in Atlantic, Ia. in 1927. After graduating from high school in 1945, he served with the U. S. Army Medical Corps during World War II. His graduate school curriculum included courses in Applied Hospital Pharmacy, Advanced Hospital Pharmacy, Advanced Manufacturing Pharmacy, Biochemistry, Chemistry of Metabolism, Pharmaceutical Chemistry, Biostatistics and Pharmacy Research. The subject of his thesis was "Particle Size Measurements and Dispersion in Dermatological Preparations." He is a member of the American Pharmaceutical Association, **American Society of Hospital Pharmacists,** Rho Chi, and an associate member of Sigma Xi. Mr. Goettsch has accepted a position on the staff of the College of Pharmacy of the University of Colorado.

Kossler *Lawson* *Superstine* *Wong* *Knapp* *Zeldis* *Goettsch*



THERAPEUTIC TRENDS

New trends in medicine and pharmacy include LONG ACTING INSULSIN — ETHYL VANILLATE IN HISTOPLASMOSIS — TREATMENT FOR PLANTAR WARTS — LONG ACTING EPINEPHRINE — TEM IN POLYCYTHEMIA VERA — 2050A IN HYPERTENSION — TEST FOR PROCAINE ALLERGY — UNDECYLENIC ACID FOR MONILIASIS

Edited by LEO F. GODLEY

New Long Acting Insulin

The Novo Laboratories in Copenhagen has prepared an insoluble insulin designated as "lenti insulin." This preparation was accomplished by use of an acetate buffer and without the use of protamine, globin, or surfene. The length of action can be varied from 12 to 36 hrs. by varying crystal size. Three preparations have been described: the shortest acting, "semi-lenti," "lenti" which is longer acting, and "ultra-lenti" which is the longest acting. The intermediate preparation is the most practical.

Two British investigators, Lawrence and Oakley, reported in the *Brit. Med. J.* 1:242 (Jan. 31) 1953, on a series of eleven diabetic patients who were hospitalized and who were maintained on lenti insulin. These investigators were pleased with the results obtained and outlined a program for needed further study. This preparation is of special interest because no foreign material other than a small amount of zinc is necessary to obtain insolubility.

Ethyl Vanillate In Histoplasmosis

Ethyl vanillate (Squibb) was employed by Zinneman *et al* in the successful treatment of a case of chronic pharyngeal and laryngeal histoplasmosis. Their report was published in *Minn. Med.* 36:249 (March) 1953.

Initially, small doses should be given and progressively increased until effective blood levels have been attained. Doses of 0.8 mg./Kg. body weight daily, given in divided doses every three hours appear to be adequate to establish therapeutic levels in adults. Almost twice that amount is necessary for children.

Injection Treatment For Plantar Warts

Plantar warts which occur on the sole of the foot can be very debilitating and are relatively difficult to remove. Current procedures employed in removal include surgery, x-ray, and electric fulguration, all of which are fraught with discomfort and danger.

Two army physicians reporting in the *New Eng. J. Med.* 248:631 (April 9) 1953, give their experiences in the treatment of this condition. Injection under pressure of 2 or 3 cc. of a one percent solution of procaine hydrochloride into the base of the wart is adequate treatment; and in 24 hours the patient is usually symptom free. Within a week the wart can be lifted out with forceps. A diagram showing the proper injection site and the angle of the needle is given. It is brought out that saline would accomplish the same results provided the proper pressure is used but that procaine renders a desirable anesthetic.

In this study, relief of symptoms occurred in 96 percent of 48 patients treated and complete cure was effected in 73 percent.

Long Acting Epinephrine Solutions

According to a report in *Ann. Allergy* 11:36 (Jan.-Feb.) 1953, the addition of propylene glycol alginate to epinephrine solutions results in a preparation the duration of activity of which may be controlled by the amount of alginate added. A characteristic formula used by this investigator follows:

Propylene glycol alginate	1.5%
Epinephrine HCl	1:500
Sodium Chloride	0.89%
Phenol	0.4%
Sodium Bisulfite	0.1%
Chlorobutanol	0.1%

The action of epinephrine hydrochloride in simple aqueous solution induces an immediate action which quickly reaches a peak, and is followed by a precipitous return to normal. The alginate preparation, on the other hand, appears to take about twice as long to reach the peak and

the activity is sustained for a considerable time. This solution was used in this study to treat patients with asthma and a wide range of allergic disorders. A larger amount of epinephrine can be administered through this pharmaceutical alteration, affording a greater measure of relief.

The algins are water soluble, non toxic, easily absorbed materials. The algins used in this study were furnished by the Kelco Company of San Diego.

TEM In Polycythemia Vera

Six patients with polycythemia vera were treated with Triethylenemelamine (TEM) and observed from 5 to 13 months. Initially, each patient was given 5 mg. TEM daily for four days, then no drug was given for four weeks. From this dosage beginning, each patient's dosage routine was individually regulated.

All six patients showed improvement at some time during the course of therapy. Three patients experienced complete relief of symptoms, two patients had a decrease in severity of symptoms, and the remaining one patient could not tolerate the drug after some time due to nausea and vomiting and treatment was discontinued.

Leukopenia, bone marrow depression, and mild nausea and vomiting are expected side effects. Other remedies that have been used in this disease include phenylhydrazine, radioactive phosphorous, nitrogen mustard, and spray radiation. TEM appears to offer less hazard and greater convenience according to this report which appeared in *Cancer* 6:327 (March) 1953. These investigators are of the opinion that a larger group of patients should be studied and TEM given a further evaluation.

2050A In Hypertension

M & B 2050A (1:5-Bis-N-(N-Methyl-pyrrolidinum) Bitartrate has a pharmacological activity which is fundamentally similar to that of hexamethonium salts. By mouth, 2050A (Research number of May & Baker, England) is 5 times more active than hexamethonium and the effects last longer. Toleration does not develop as rapidly and the dose is much smaller than with hexamethonium.

According to these investigators' report found in *The Lancet* 1:457 (March 7) 1953, patients should be hospitalized or watched closely in a clinic while being regulated on 2050A. Postural hypotension may develop while in the erect position, and after meals there is also a fall in blood pressure. Headache and breathlessness have been less bothersome with this drug.

Patients who cannot take the drug orally may be treated by subcutaneous injection. The oral route is simpler and preferable. Dosage may begin as low as 10 mg. but the dosage for each patient is carefully determined. This dosage represents the maximum amount of drug which just fails to induce hypotensive symptoms. These investigators are of the opinion that this drug has significant advantage over hexamethonium compounds.

Test For Procaine Allergy

Two clinicians reporting in *J. Am. Med. Assoc.* 151:1185 (April 4) 1953 relate their experiences in allergic responses to procaine. Three fatalities were described. They suggest that in patients where sensitivity is suspected that a sensitivity test be performed. This test consists of intranasal application of procaine solution (or any other anesthetic agent) with an applicator. If the patient is severely sensitive, a response will be apparent in a very few minutes. Conjunctival and sublingual applications have been tried, but these tests are not nearly as reliable as the intranasal. The surprising fact is brought out that skin tests are of no value in determining sensitivity to procaine.

Undecylenic Acid For Moniliasis

Oral undecylenic acid simultaneously administered with the broad spectrum antibiotics has given remission from the so called monilial complications that result from this antibiotic therapy. These symptoms include: pruritis ani and vulvae, glossitis, pharyngitis, vaginitis, etc. Nausea and diarrhea were not overcome. This study was reported in *Am. J. Med. Sci.* 225:274 (March) 1953.

Up to four Gm. of undecylenic acid daily were given in three divided doses. There were no untoward effects noted. The average dose advised is 0.44 Gm. for each 250 mg. of antibiotic. It was noted that the undecylenic acid did not completely clear the stools of monilia and it is therefore thought that the action is fungistatic rather than fungicidal. It is further suggested that the undecylenic acid might act through some process whereby the fungus is prevented from attacking the body tissue.

This study was carried out on 42 patients and it is thought that a larger group of patients would be desirable for further evaluation.

* TIMELY DRUGS

Androlone

. . . a crystalline steroid hormone having anti-tumor and anabolic effects comparable to those of the testosterones, but with markedly less androgenic effects, has been introduced by The National Drug Company, Philadelphia. Androlone is indicated for patients with inoperable carcinoma of the breast and those debilitated by acute or chronic illnesses. Since Androlone is mildly androgenic, it should not be administered to patients with carcinoma of the prostate. Dosage should be reduced or discontinued if side effects appear. Androlone is supplied in 10 cc. multiple dose vials, 50 mg. per cc. as a suspension in isotonic sodium chloride solution.

Aureomycin Triple Sulfas

. . . a new preparation available from Lederle Laboratories, combines four antibacterial agents in one tablet— Aureomycin (125 mg.), sulfadiazine (167 mg.), sulfamerazine (167 mg.), and sulfamethazine (167 mg.). The antibacterial action of any one of these drugs supplements the action of the others, thereby increasing their effectiveness over the use of any of them singly in the treatment of certain types of infections. The combination has proved itself to be a rapid and efficient medication in the treatment of dysentery caused by the shigella group, and gonococcal infections. Also, since the mechanisms of action of the two drugs are different, their combined use promises to be an effective method of preventing the development of mutant drug-fast bacterial strains. Aureomycin Triple Sulfas should be administered either after a meal or with a bland drink, such as milk, and patients should be under clinical supervision during the course of treatment.

Binaemon

. . . pronounced bi′ - nĕ - mon, is a hematinic preparation recently introduced by Organon Inc. Oral administration of vitamin B_{12} is effective only in a ratio to the amount of intrinsic factor secreted in the patient's stomach. Since Binaemon contains Bifacton (Vitamin B_{12} with Intrinsic Factor Concentrate), it assures the absorption of vitamin B_{12} regardless of the patient's own gastric secretion of this vital nutritional principle. In addition, Binaemon supplies folic acid, essential in the treatment of most anemias and believed to have synergistic or additive action with B_{12}; ferrous sulfate; vitamin C; and liver concentrate.

Candettes

. . . are orange-flavored troches containing polymyxin B, 1,000 units, and bacitracin, 50 units. Available from the Chas. Pfizer & Co., Inc., Candettes are recommended for the control of superficial infections of the mouth and throat and for prophylactic use after dental procedures.

Chlor-Trimeton Injection "10"

. . . is an antihistamine indicated for use in the prevention of distressing reactions which may result from blood transfusions. These may include such reactions as mild to severe chills with associated fever, nausa, vomiting, malaise, or prostration. Chlor-Trimeton Injection, supplied by the Schering Corporation, is said to act rapidly, have a wide range of safety and relative infrequency of undesirable side actions. The average dose which is combined with stored or fresh whole blood is 10 mg. injected intravenously (when diluted), intramuscularly, or subcutaneously. The maximum recommended dose is 40 mg. for 24 hours. It is supplied in 1 cc. ampuls, each containing 10 mg.

Chlor-Trimeton Injection "100"

. . . containing 100 mg. of the active ingredient (Chlor-Trimeton Maleate) per cc., is supplied by Schering Corporation for use against certain reactions. It is indicated for prophylactic use against penicillin reactions, drug reactions, desensitization, as well as use in oral surgery. Therapeutically, it may be used in drug reactions, acute or chronic urticaria, angioedema, edema and pruritus, ivy poisoning, symptoms associated with perennial or seasonal rhinitis, pollen type asthma, local or systemic desensitization reactions, as well as other conditions such as contact and eczematoid dermititis, atopic eczema and non-specific pruritus.

As a prophylactic, the average recommended dose is 5 to 10 mg. administered subcutaneously or intramuscularly. Therapeutically, the average recommended dose is 10 to 20 mg. by subcutaneous or intramuscular injection. When intravenous therapy is desired the special intravenous ampul (10 mg. in 1 cc.) should be used— properly diluted.

Covicone Cream

. . . a protective skin cream available from Abbott Laboratories, is a special plasticized combination of silicone (dimethylpolysiloxane), nitrocellulose and castor oil in vanishing cream base. It forms an invisible plastic-like film that acts as a physical barrier against sensitizing external agents. The film is not removed by washing and is not sticky or greasy. Covicone Cream is indicated for protection of the skin from oc-

cupational dermatoses, such as sensitivity of chemicals, paints, dyes and cutting oils; everyday contact skin allergies, such as soap and water dermatitis and sensitivity to cosmetics, clothing dyes and pollens; inflammation from body fluids, as occurs with ileostomies, colostomies, gall bladder drainage tubes, persistent diarrhea and decubitus ulcers; and protection from scratching and further irritation of dry eczematous and neurodermatitic lesions. It is recommended that Covicone Cream be applied twice daily for ten days to two weeks to build up a protective layer. Continued protection can then be maintained with a single application every one or two days.

Daraprim

. . . is a new antimalarial supplied by Burroughs Wellcome and Company. Each scored tablet contains 25 mg. of 2,4-diamino-5-*p*-chlorophenyl-6-ethylpyrimidine. In prophylaxis, 25 mg. per week is recommended for persons entering malarious regions and for populations of these regions during the malaria season. In therapy, for the acute attack, one or two doses of 50 mg. is recommended. In vivax (benign tertian) malaria, this is followed by 25 mg. once weekly for 8 to 10 weeks to eradicate relapsing forms.

Depo-Cer-O-Cillin

. . . a brand of chloroprocaine penicillin O, is a water-insoluble crystalline salt of penicillin O (allylmercaptomethyl penicillin), packaged in 1,500,000 units in a sterile vial. Addition of 4.2 cc. of sterile water for injection or sterile isotonic solution of sodium chloride provides 5 cc. of suspension containing 300,000 units of Depo-Cer-O-Cillin per cc. In the dry form it is stable for 36 months at room temperature. Suspensions are stable at room temperature for one week and at refrigerator temperature for three weeks. Cer-O-Cillin and its chloroprocaine salt have been shown to be less allergenic than penicillin G. The majority of patients sensitive to penicillin G may receive Depo-Cer-O-Cillin without developing allergic reactions. Since the range of antibacterial activity and blood concentrations following intramuscular injection are similar to penicillin G the indications and dosage are the same. In the treatment of acute staphylococcic, streptococcic and pneumococcic infections, the minimum daily dose is 300,000 units. In bacteremia and other severe infections, a dose of 300,000 units every twelve hours may be required. In gonorrhea, a single dose of 300,000 units may be adequate; however, patients failing to respond should be re-treated until a cure is obtained. The average dose is 300,000 units by intramuscular injection. Depo-Cer-O-Cillin is available from the Upjohn Company.

Dihydro Dispolator

. . . is dihydrostreptomycin sulfate for inhalation therapy in the control of certain infections of the respiratory tract. Supplied by E. R. Squibb and Sons, the Dihydro Dispolator is a disposable plastic inhaler containing 50 mg. of micropulverized dihydrostreptomycin sulfate. Since there is almost no systemic absorption of dihydrostreptomycin powder following topical application to mucosal surfaces, the use of the Dihydro Dispolator involves almost no danger of systemic toxicity. Sensitivity reactions have been rare and mild. It is indicated in cases of bronchiectasis, chronic and allergic bronchitis, acute and subacute respiratory infections susceptible to dihydrostreptomycin and for prophylaxis in chest surgery.

Duo-Strep

. . . is a mixed antibiotic product composed of equal percentages of crystalline dihydrostreptomycin and streptomycin sulfates. Duo-Strep is recommended for use in the treatment of tuberculosis in combination with *para*-aminosaliyclic acid or other chemotherapeutic agents. The product is also indicated in the treatment of pneumonia caused by *Hemophilus influenzae,* tularemia, brucellosis with bacteremia, plague and certain venereal diseases when the patient is known to be allergic or unresponsive to penicillin or sulfonamides. Duo-Strep is supplied in sterile, rubber-stoppered vials containing one or five Gm. of the dry mixture. When stored in dry form in the original unopened container, it is stable at room temperature for four years. Duo-Strep is available from Merck and Company.

Furadantin

. . . a chemotherapeutic agent indicated in urinary tract infections, including pyelonephritis, pyelitis and cystitis, has been announced by Eaton Laboratories, Norwich, N. Y. Chemically, it is N-(5-nitro-2-furfurylidene)-1-aminohydantoin. Furadantin is available in either 50 or 100 mg. tablets.

Gantrisin Diethanolamine Ear Solution

. . . is a stable, sterile, antibacterial solution for the treatment of ear infections. It provides four percent Gantrisin for local antibacterial action, ten percent urea for promotion of healing and three percent chlorobutanol for relief of pain. Supplied by Hoffmann-La Roche, this preparation is said to be valuable both in the treatment of ear infections and for prophylactic use following surgery.

Kaopectate with Neomycin

. . . is a palatable, aqueous preparation of neomycin sulfate, with kaolin and pectin suspended with methylcellulose. This combination, made available from The Upjohn Company, provides the adsorbant and demulcent action of kaolin and pectin and the antibacterial action of neomycin. Kaolin, by mechanical action, adsorbs irritating and toxic substances from the intestinal tract and forms a protective coating on the intestinal walls, which also serves as a filter to prevent the absorption of toxins. Neomycin has a wide range of antibacterial action against most bacteria commonly present in the intestinal tract and those organisms frequently responsible for diarrhea. It is poorly absorbed from the gastro-intestinal tract and rarely causes systemic toxicity. Kaopectate with Neomycin is indicated in the symptomatic treatment of diarrhea and as a specific therapy in bacterial diarrhea caused by neomycin-susceptible organisms.

Levo-Dromoran Tartrate

. . . is a new, synthetic narcotic which is approximately twice as potent as the original Dromoran (dl) Hydrobromide. Levo-Dromoran Tartrate in 2 mg. dosage forms will eventually replace Dromoran (dl)

Hydrobromide according to Hoffmann-La Roche Company which distributes both forms. Levo-Dromoran has a morphine-like action but has the advantage of providing longer-lasting relief of severe pain and causes fewer side reactions, such as nausea, hangover and constipation. Chemically, Levo-Dromoran Tartrate is the levorotatory form of 3-hydroxy-N-methylmorphinan tartrate.

Noctec

. . . (Squibb Chloral Hydrate) is now available in a small size, 3¾ gr. capsule. Noctec capsules will be useful in sedation for children and for adults who require a smaller dose.

Parepectolin

. . . is a stable colloidal suspension of paregoric (equivalent), 1 dram; pectolin, 2.5 grains; and kaolin, 85 grains. Parepectolin is recommended for treatment of specific and nonspecific diarrheas and for relief of colic and abdominal tenderness. It is available from William H. Rorer, Inc., Philadelphia, Pa.

Plavolex

. . . is a six percent solution of super-refined dextran for use in increasing the fluid volume of the circulatory system, as in shock. The solution is for intravenous use. Plavolex is supplied by Wyeth Laboratories.

Pro-Banthine

. . . is a new anticholinergic agent recently made available by the G. D. Searle and Company. It is said to have minimal side effects, small dosage — high potency, agreeable taste and convenient dosage schedule. Pro-Banthine is supplied in tablet form, each tablet containing 15 mg. of *beta*-diisopropylaminoethyl xanthene-9-carboxylate methobromide. It is indicated in the treatment of peptic ulcer, gastritis and certain other gastrointestinal disorders; control of hyperemesis gravidarum and hyperhidrosis.

Pronatin

. . . is a new nutritional product indicated for use in geriatrics, lactation and pregnancy. Pronatin, supplied by McNeil Laboratories, offers a convenient high-potency source of vitamins and iron with supplementation of calcium and phosphorous.

Raudixin

. . . . (Squibb *Rauwolfia serpentina*) is now available in tablet form. Raudixin is reported to be safer than other hypotensive agents and has no serious side effects. Its action is mild and gradual, but once achieved, may last for several weeks after withdrawal. Hence, Raudixin is especially recommended in relatively mild cases of hypertension where the risks associated with treatment with other hypotensive agents would not ordinarily be justified.

Ray-X

. . . is a new type surgical sponge with a barium sulfate insert that is x-ray detectable. It is employed in hospital operating rooms to eliminate the need of exploratory reoperations to determine presence of sponge. With Ray-X sponges, positive diagnosis can be made through use of x-rays. Supplied by Parke, Davis and Company, Ray-X is available in containers of 100 in three sizes, 3" x 3", 4" x 4" (16 ply), and 4" x 8", and in containers of 200 in one size, 4" x 4" (eight ply).

Stilbamidine Isethionate

. . . for the treatment of systemic fungus infections, is now available from The Wm. S. Merrell Company, Cincinnati, Ohio. Some of the diseases which are usually fatal and have previously failed to respond to most methods of therapy have been successfully treated with Stilbamidine It has been used to treat blastomycosis, leishmaniasis and multiple myeloma. Although Stilbamidine probably does not alter the course of the disease, it has dramatically relieved the bone pain associated with it in a majority of cases.

Stilbamidine must be given only under careful medical supervision. Solutions should be freshly prepared within an hour of use and protected from light. It is administered by intravenous injection with a continuous slow drip. A course of therapy is usually 15 injections of 150 mg. (Precautions and contraindications should be known in advance of therapy.)

Streptohydrazid

. . . is a combination of streptomycin, one Gm., with isoniazid, 236 mg., supplied by the Chas. Pfizer Company. It is used by intramuscular injection in the treatment of tuberculosis.

Surdon

. . . for the relief of premenstrual tension and dysmenorrhea, has been introduced by Organon Inc. Each Surdon tablet contains 5 mg. of Progestoral (brand of ethisterone), 15 mg. of thiamine hydrochloride and 15 mg. of phenobarbital. The average dose is one or two tablets per day during the last seven to ten days of the menstrual cycle.

Synkayvite-C Lozenges

. . . are new, orange-flavored lozenges which provide vitamin C for promotion of wound healing and vitamin K for prevention of secondary hemorrhage following tonsillectomy. Synkayvite-C Lozenges are available from Hoffmann-La Roche.

Telepaque

. . . a radiopaque compound available from Winthrop-Stearns, Inc., is now available in 0.5 Gm. tablets in bottles of 500.

Tetrobarbs

. . . is a combination of pentylenetetrazol, 150 mg. and phenobarbital sodium, 100 mg. which is claimed to reduce "hangover" and to reduce the dangers of overdosage. Tetrobarbs, in capsule form, has recently been released by Strong Cobb and Company, Inc., Cleveland.

Viomycin

. . . for treating tuberculosis has recently been announced by Parke, Davis and Company. It is an antibiotic which has been isolated from growths of bacterium found in Florida soil. It should be prescribed in combination with streptomycin, dihydrostreptomycin, *para*-aminosalicylic acid or isonicotinic acid hydrazide. Viomycin (Sulfate) is supplied as a sterile powder in Steri-Vials containing the equivalent of 1.0 Gm. of Viomycin base.

CURRENT LITERATURE

Edited by SISTER MARY ETHELDREDA, *St. Mary's Hospital, Brooklyn, N.Y.*

American Professional Pharmacist

MARCH, 1953—"A New Method to Produce Distilled Water," by Mary A. Lane, Thomas Manzelli and Herbert Flack. The Liqui-jector Steam Conditioning System for producing pyrogen-free distilled water is discussed. Specific information on equipment required, cost, and method of operation is outlined by the authors who have set up the system at Jefferson Medical College Hospital, Philadelphia, Pa. *page 204*

APRIL, 1953—"Drug Charges in Hospitals: Review of Opinions," by Robert Lantos, Hospital Pharmacy Intern, University of Michigan Hospital, Ann Arbor, Mich. Literature on pricing drugs in hospitals is covered and some conclusions reached concerning the varied formulas and methods of arriving at drug charges. *page 300*

Drug and Cosmetic Industry

MARCH, 1953—"Pharmaceutical Aspects of Vitamin B_{12}," by Walter C. Gakenheimer, Merck and Company. Covers various phases in manufacturing vitamin B_{12} preparations including parenteral solutions, oral liquids, compressed tablets, etc. *page 321*

"Waterless Hand Cleansers," by Milton Lesser. A documented paper giving formulas. *page 326*

"Chlorophyll in Internal Medicine," by F. Howard Westcott, M.D. Reviews the use of chlorophyll fractions (magnesium/sodium chlorophyllins) for internal use giving the present status of therapeutic uses. *page 328*

Hospital Management

APRIL, 1953—"The Pharmacist is Your Ally," by Jerome M. Yalon, formerly chief pharmacist and now assistant administrator at University of California Hospital. Presents a plea to manufacturers and their detail men to give the pharmacists and physicians the latest and best information on drugs and pharmaceuticals. The author outlines important phases of the detail man's responsibility to the hospital staff. *page 81*

MAY, 1953—"Who Should Manage Central Sterile Supply?" by William E. Hassan, Jr., pharmacist-in-chief, Peter Bent Brigham Hospital, Boston, Mass. Referring specifically to the manufacture of sterile parenteral fluids, the author believes the pharmacist is best qualified to manage the department. He elaborates on the necessary controls and checks, and discusses problems in storage and distribution of the finished products. *page 78*

Hospital Progress

MARCH, 1953—"The Proper Labelling of Medicine," by Sister Joseph Marie, St. Mary's Hospital, St. Louis, Mo. A documented study of proper labelling for prescriptions is presented. The various phases of labelling is discussed with emphasis on the legal and psychological aspects. *page 68*

APRIL, 1953—"Program for the 1953 Pharmacy Institute (C.H.A.)." *page 88*

J. Am. Pharm. Assoc., Pract. Pharm. Ed.

MARCH, 1953—"Glycerin and Alcohol Substitutes in Pharmaceutical Preparations," by R. G. Boeke and R. L. Van Horne. Possibilities and advantages of replacing alcohol and glycerin with propylene glycol are discussed. Stability, compatibility and cost are considered. *page 166*

APRIL, 1953—"An Equation for use with the Simplified Method of Preparing Isotonic Solution," by Joseph B. Sprowls, dean, Temple University School of Pharmacy, Philadelphia. The author presents an equation which can be used in calculating the volume if isotonic solution which can be prepared from 0.3 Gm. of any drug. *page 216*

Public Health Reports

MAY, 1953—"Developing Trends and Standards of Sound Drug Therapy." Report of a symposium on the official drug standards as presented at the Pharmacy Section, American Association for the Advancement of Science, December, 1952. *page 509*

Southern Hospitals

APRIL, 1953—"The Use of Radioisotopes in Pharmacy." Editorial comment on the role of the hospital pharmacist in handling radioisotopes since this presents a new form of therapy and the products are listed as "new drugs." *page 59*

the Veterans Administration

PHARMACIST

Edited by EDDIE WOLFE, *Mt. Alto Veterans Hospital, Washington, D.C.*

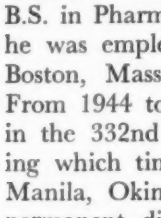
A Roster of VA Pharmacists

North Little Rock, Ark.

Mr. Sewall Kepner is chief pharmacist at the VA Hospital, North Little Rock, Ark. He was born in Chicago, Ill., and began his pharmaceutical career as a clerk in a drug store in Oklahoma in 1911. He attended the School of Pharmacy, University of Oklahoma, was registered by examination by the Oklahoma State Board of Pharmacy in 1915, and reciprocated to Texas in 1925. During the time he attended the University he was a member of the Oklahoma National Guard, Field Hospital No. 1. In the summer of 1915 he spent three months at Ft. Riley, Kansas, and later served with Field Hospital No. 1 during the Mexican Border incident. He was inducted with his unit into Federal service and sent to Camp Bowie, Ft. Worth, Texas. After the Armistice he was chosen as one of the men who were allowed to pursue special studies in the University of Nancy, France, where he took a course in Chemistry. He was discharged from the service in 1919. He remained in Texas, working in various retail pharmacies until 1930, when he took a position with a wholesale drug house as pricer and buyer. In December, 1938, he joined the VA as assistant pharmacist at the VA Hospital, Waco, Texas. On Sept. 1, 1940, he transferred, as chief pharmacist, to the VA Hospital, North Little Rock, Arkansas.

Northhampton, Mass.

Mr. Michael Pergant was graduated from Massachusetts College of Pharmacy in 1936, with a B.S. in Pharmacy. From 1936 to February, 1944, he was employed by United Drug Company of Boston, Mass., as a manufacturing pharmacist. From 1944 to 1946, he served in the U.S. Army in the 332nd General Medical Dispensary, during which time his unit served in New Guinea, Manila, Okinawa, and finally in Yokohama. A permanent dispensary was set up in Yokohama and he was in charge of the pharmacy, which served army and civilian personnel. Mr. Pergant entered the VA in April, 1948, as assistant pharmacist at the VA Hospital, Northampton, Mass., and shortly afterwards became chief pharmacist, in which capacity he serves at this time. He is a member of the American Pharmaceutical Association and Phi Delta Chi fraternity.



Oakland, Calif.

Miss Martha Fong received her B.S. Degree from the University of California College of Pharmacy in 1947. Following graduation she began working at the French Hospital in San Francisco, Calif., remaining there for a year. In March 1949, she began working with the VA at the Oakland Subregional Office. In July 1949, she was transferred to the San Francisco Regional Office. In October 1950, she was again transferred, this time going to the Oakland VA Hospital, where she has been since that time. She is a member of the Northern California Society of Hospital Pharmacists as well as the A.Ph.A. and ASHP.

Notes and Suggestions

PRACTICAL FORMULAS

FOR USE IN HOSPITALS

ADHESIVE REMOVER (NON-INFLAMMABLE)

Benzene	950 cc.
Neutralizer 1-A-1[1]	3 cc.
Lavender Oil	10 cc.
Carbon Tetrachloride, to make	3800 cc.

This formula has been presented by Mr. Herbert Flack of Jefferson Hospital as a useful one to overcome the fire hazards of benzene when this substance is used on nursing units to remove adhesive tape.

ANTIPYRINE EAR DROPS

Antipyrine	24 Gm.
Ethyl Aminobenzoate	5 Gm.
Glycerin	445 cc.

Mix the two powders and dissolve in warmed glycerin. Filter through cotton.

This formula was presented by Mr. Herbert Flack at a recent institute on hospital pharmacy.

AEROSOL PENETRATION CREAM

Dioctyl Sodium Sulfosuccinate Aqueous 10%	10 Gm.
Wax, White	11 Gm.
Paraffin	10 Gm.
Petrolatum, liquid, medium viscosity	40 Gm.
Bentonite Magma	29 Gm.

Aerosol Penetration Cream is suggested to be used where penetration of an active agent through the intact skin is desired. The base penetrates hair follicles and pores; it will carry either aqueous, oily, or insoluble agents. The base is usually prescribed containing an active ingredient. Since this base brings an active agent into more intimate contact with the skin than is the case with fatty bases, the concentration of active ingredients prescribed in the latter is usually halved when prescribed in aerosol base. The base should be stored in a cool place in tightly capped tubes.

This formula appears in the *Formulary and Therapeutic Guide of The New York Hospital.*

[1]Magnus, Mabee and Reynard, Inc.

DUPONOL PENETRATION CREAM

Sodium Lauryl Sulfate	1.0 Gm.
Cetyl Alcohol	1.5 Gm.
Stearyl Alcohol	5.0 Gm.
Paraffin	10.0 Gm.
Petrolatum, liquid, medium viscosity	15.0 Gm.
Spermaceti	20.0 Gm.
Distilled Water	47.5 cc.

It is suggested that this base be used as a vehicle for active agents where penetration of the pores of the skin and around the hair follicles is desired. Duponol base is designed for use on oily skin, in contrast to Aerosol Penetration Cream. Because the base facilitates skin penetration, the active ingredients are prescribed in about half the concentration employed with greasy bases. The base should be stored in tightly capped tubes and in a cool place.

This formula appears in the *Formulary and Therapeutic Guide of The New York Hospital.*

FOR EYE INSTRUMENT STERILIZATION

Cresol	80 cc.
Thymol	80 Gm.
Formaldehyde	80 cc.
Ethyl Alcohol 95%, to make	4000 cc.

This formula appears in the *University of California Hospital Formulary* (1952.).

FOR INSTRUMENT STERILIZATION

Benzalkonium Chloride Solution 10%	80 cc.
Sodium Nitrate	20 Gm.
Sodium Bicarbonate	40 Gm.
Mint Green Color	4 gtt.
Distilled Water, to make	4000 cc.

This formula appears in the *University of California Hospital Formulary* (1952).

SUTURE STERILIZING SOLUTION

Isopropyl Alcohol 99%	70.0 cc.
Formaldehyde	1.0 cc.
Sodium Nitrite	0.1 Gm.
Sodium Bicarbonate	0.1 Gm.
Distilled Water, to make	100 cc.

This formula appears in the *University of California Hospital Formulary* (1952).

CHOLINE CITRATE AROMATIC SOLUTION 25%

Choline Dihydrogen Citrate	30.0 Gm.
Vanillin	0.12 Gm.
Saccharin Soluble	0.09 Gm.
Glycerin	6.0 cc.
Orange Flower Water	24.0 cc.
Aromatics, q.s.	
Color, q.s.	
Distilled Water, to make	120 cc.

This formula appears in the *University of California Hospital Formulary* (1952).

ORAL DEMEROL SOLUTION

Vanillin	0.05 Gm.
Alcohol 95%	25.0 cc.
Spirit of Orange (terpineless)	3.0 cc.
Sucrose	15.2 Gm.
Demerol Hydrochloride	1.25 Gm.
Distilled Water, to make	100.0 cc.

This formula has been suggested by Mr. John Murphy of Massachusetts General Hospital.

ACRIDINE NIPPLE CREAM

Carbowax 4000	2500 Gm.
Propylene Glycol	2490 cc.
9-Aminoacridine Lauryl Sulfate	10 Gm.

This formula appears in the *University of California Hospital Formulary* (1952).

DIAPER RINSE

Quaternary Ammonium Chloride 12.8%	150 cc.
Sodium Bicarbonate	154 Gm.
Distilled Water, to make	4000 cc.

This formula appears in the *University of California Hospital Formulary* (1952).

HAND LOTION

Glycerin	570.0 cc.
Alcohol 95%	570.0 cc.
Carboxymethylcellulose (low viscosity)	38.0 Gm.
Amaranth Solution U.S.P.	1.0 cc.
Coumarin	0.04 Gm.
Benzalkonium Chloride Solution 10%	4.0 cc.
Distilled Water, to make	3800.0 cc.

Heat 2655 cc. of distilled water to boiling and add the carboxymethylcellulose. Cool in a refrigerator. Dissolve the coumarin in the alcohol; add this to the benzalkonium chloride solution and the amaranth solution. Combine the two solutions and mix well.

This formula has been suggested by Mr. Herbert Flack of Jefferson Hospital.

BENZALKONIUM CHLORIDE CONCENTRATE SOLUTION

Benzalkonium Chloride Solution 10%	3140 cc.
Sodium Nitrite (as antirust)	450 Gm.
Dye Concentrate*	175 cc.
Water, to make	19,000 cc

Add the sodium nitrite to about half the volume of water. Add the dye concentrate solution, benzalkonium chloride solution and water to volume. Filter.

Package in 240 cc. (8 ounce) bottles. When this quantity is diluted to one gallon, a 1:1000 Benzalkonium Chloride Solution results.

* Many dyes may be used. Avoid a dye that might inactivate the Benzalkonium Chloride. A formula for a green coloring is as follows:

DYE CONCENTRATE FOR BENZALKONIUM CHLORIDE CONCENTRATE SOLUTION

F. D. and C. Blue No. 1[1]	1.3 Gm.
Limecone Yellow[1]	2.5 Gm.
Methylparaben	0.026 Gm.
Propylparaben	0.014 Gm.
Distilled Water, to make	100.0 cc.

BENZALKONIUM CHLORIDE MOUTH WASH

Benzalkonium Chloride Solution 10%	6.0 cc.
Saccharin Sodium	0.45 Gm.
Amaranth	0.2 Gm.
Cinnamon Oil	2.0 cc.
Tween 20[2]	11.9 cc.
Distilled Water, to make	1000.0 cc.

To about 900 cc. of water, add the saccharin and amaranth. Mix the cinnamon oil and Tween 20. Add this to the water solution. Add other ingredients and dilute to volume with water. Mix well and filter.

When diluted with 2 parts of water, makes a 1:5000 solution of Benzalkonium Chloride.

---

[1]National Aniline Division, Allied Chemical and Dye Corp., N.Y.C.

[2]Atlas Powder Co., Industrial Chemicals Dept., Wilmington, Del.

A.S.H.P. AFFILIATES

Greater New York Chapter

Members of the Greater New York Chapter of the ASHP were guests of the Ciba Pharmaceutical Company on April 28 in lieu of a regular meeting. Following lunch, a film on Coramine was shown. It illustrated the effectiveness of this drug as a respiratory and cardiac stimulant and as an anti-pellagric agent. A tour of the plant covered sections devoted to pharmaceutical research and production.

Greater St. Louis

"Decade of Pharmaceutical Progress" was the subject of a talk presented by Dr. B. Berryman of Abbott Laboratories at the March 8 meeting. He covered the antibiotics in particular starting with introduction of the sulfonamides.

Election results were announced at the April 14 dinner meeting which was sponsored by Hoffmann-La Roche. Officers re-elected include George V. Horne, president, Jewish Hospital, St. Louis; Oliver Steppig, vice-president, Alexian Brothers Hospital, St. Louis; and Florence Mueller, secretary, 4930 Terry, St. Louis. The new treasurer is Sister Joseph Marie, St. Mary's Hospital, St. Louis.

Indiana Chapter

Members of the Indiana Chapter of the ASHP met in South Bend on February 28 and March 1. In addition to the business session, an outstanding program was arranged by Mr. William Wissman, Methodist Hospital, Fort Wayne. As the result of a questionnaire to members, it was found that there was particular interest in formularies, pricing, manufacturing and the Durham-Humphrey Amendment to the Food, Drug and Cosmetic Act, all of which were covered during the two-day session.

Meeting again on March 30 in conjunction with the Purdue Professional Pharmacy Clinic, routine business was covered and plans made to request a page devoted to hospital pharmacy in the *Indiana Pharmacist.*

Louisiana Society

At a regular meeting of the Louisiana Society of Hospital Pharmacists held Thursday, March 19 at Mercy Hospital, the members voted acceptance for affiliation with the Louisiana Hospital Association. The membership also ratified the appointment of Mr. Wm. P. O'Brien, Touro Hospital, as the Society's representative on the New Orleans Hospital Council. Discussions at this meeting also covered plans for the Southeastern Society's meeting which was held in New Orleans in April.

Midwest Association

The March 21 meeting of the Midwest Association of Hospital Pharmacists was held at the Creighton University College of Pharmacy in Omaha, Nebr. Included on the program was a film on "Cortone Therapy" and a report on the progress made on the project, "Antiseptics for Thermometers" presented by Dr. C. F. Lord and Dr. N. Hansl.

Massachusetts Society

Members of the Massachusetts Society of Hospital Pharmacists met on March 24 in conjunction with the New England Hospital Assembly at Hotel Statler, Boston. New officers elected for the ensuing year are President Mrs. Ethel Pierce, South Shore Hospital, Weymouth; Vice-President Dr. William Hassan, Peter Bent Brigham Hospital, Boston; Secretary Edward Fantasia, Quincy City Hospital, Quincy; and Treasurer Sister Mary Edward, St. Vincent's Hospital, Worcester.

Society of Alabama

"How the Pharmacist Can Best Serve the Administrator" and "How the Pharmacy Can Best Serve the Medical Staff" were discussed by D. O. McClusky and Dr. Judson Dowling at the January 24 meeting of the Society of Alabama Hospital Pharmacists. Business covered during the meeting included time and place of meetings, a change in the Constitution and By-Laws providing for associate members, and activities of the Special Projects Committee.

North Carolina Society

Members of the North Carolina Society of Hospital Pharmacists will meet in Asheville on July 18. Officers for the current year are President James W. Mitchener, Cabarrus Memorial Hospital, Concord; Vice-President Rudolph Hardy, Gaston Memorial Hospital, Gastonia; Secretary Wesley T. Collier, North Carolina Memorial Hospital; and Treasurer Nell Evans, Charlotte Memorial Hospital, Charlotte.

South Carolina Society

At a meeting held at the Columbia Hotel in Columbia, South Carolina, the hospital pharmacists organized a state group. Mrs. Lillian Price and Miss Johnnie Crotwell, representing the Projects Committee of the Southeastern Society, gave the hospital pharmacists background information on the activities of the

local groups as well as the American Pharmaceutical Association and the AMERICAN SOCIETY OF HOSPITAL PHARMACISTS. Plans were made to contact all pharmacists practicing in hospitals in South Carolina and to proceed with organizing an affiliated chapter of the ASHP.

Georgia Society

The Georgia Society of Hospital Pharmacists held its annual meeting at the Jung Hotel in New Orleans, La., on April 8 in conjunction with the meeting of the Southeastern Society. Grover C. Bowles, president of the ASHP, was the principal speaker and told of the work of the SOCIETY and affiliated organizations. Savannah was selected for the July meeting with plans to be announced later. Mrs. Clara Greene, chief pharmacist at University Hospital in Augusta, was elected president for the coming year.

Southeastern Society

Miss Johnnie M. Crotwell, chief pharmacist, Georgia Baptist Hospital, Atlanta, was elected president of the Southeastern Society of Hospital Pharmacists at the annual meeting, April 8-10 in New Orleans. Other officers named were Valerie Armbruster, Charity Hospital, New Orleans, vice-president; and Oma Dell May, Anniston Memorial Hospital, Anniston, Alabama, secretary-treasurer. More than 100 members and guests attended the Society meetings to hear papers on business practices, purchasing methods, international pharmacy and scientific discussions of drugs by leading clinical researchers.

"Should the Hospital Pharmacist Be Subjected to Centralized Purchasing?" was the subject of a lively debate and discussion. Upholding the affirmative was Sam Redfearn, purchasing agent of Touro Infirmary, New Orleans; defending the pharmacy position was Grover Bowles. Since the audience was predominated by pharmacists, it was the general concensus that the pharmacist should specify for all drugs purchased, while the purchasing agent should place the order and keep the records with the assistance of the pharmacist.

Another interesting paper was given by President Bowles on "International Pharmacy." Mr. Bowles described his recent trip to the continent and urged pharmacists to interest themselves in the international aspects of pharmacy.

Miss Johnnie Crotwell, President, S.S.H.P.

The next annual meeting of the Southeastern Society will be held next April in Atlanta, Georgia.

Oklahoma Society

Mr. Stokes E. Baggett of the Veterans Administration was the principal speaker at the March 18 meeting of the Oklahoma Society of Hospital Pharmacist. He covered the operation of the pharmacy, explaining methods of keeping records, manufacturing and showing the up-to-date formulary kept at the hospital.

The April meeting of the Oklahoma Society was held in conjunction with the annual convention of the Oklahoma State Pharmaceutical Association. Mr. E. R. Weaver, secretary of the state organization brought greetings to the hospital pharmacists. The principal speaker was Mr. Harry J. Towers, manager of Retail Production of the E. R. Squibb Co., whose title was "We Are All On The Team?"

Northern California

Meeting at Herrick Memorial Hospital in Berkeley on April 14, members of the Northern California Society heard Dr. Leon Lewis, a specialist in poliomyelitis and communicable diseases, discuss "Iran Today." His talk was illustrated with slides. Also on the program was a seminar led by Mr. Stanley Marincik, chief pharmacist at the University of California Hospital. The topic was "Investigational Drugs Used in Your Hospital and How to Obtain Information About Them."

Texas Society

Miss Adela Schneider, vice-president-elect of the ASHP, was installed as president of the Texas Society at the annual meeting held in Austin, April 20-21. Meeting in conjunction with the Annual Seminar for Hospital Pharmacists at the University of Texas, the group reported 13 new members during the past year. Efforts are being made to organize hospital pharmacists' groups in the larger cities suggesting that at least one meeting be held each year.

Arizona Society

Study of the Proposed Point-Rating Plan for evaluating hospital pharmacy services will be a project of the Arizona Society for the coming year. Dr. A. L. Picchioni and Dean Willis R. Brewer have been appointed to work on the project along with a representative of the State Board of Pharmacy.

New officers of the Arizona Society installed at the April 14 meeting in Phoenix include President Rextell West, St. Joseph Hospital, Phoenix; Vice-President Evelyn D. Timmons, Memorial Hospital, Phoenix; Recording Secretary Yvonne M. Anderson, Memorial Hospital, Phoenix; Corresponding Secretary Sister Elizabeth Joseph Scherer, St. Mary's Road, Tucson; and Treasurer Harry Ferguson, Tucson Medical Center, Tucson.

Ohio Society

Mr. Russell Lovell, Akron City Hospital, Akron, was elected president of the Ohio Society at the annual meeting held in Cincinnati April 6, 7 and 8. Included on the program were papers on Surgical Solutions; Small Volume Parenteral Solutions; Large Volume Parenterals; Equipment for the Solutions Room; Point-Rating the Hospital Pharmacy; Services the Hospital Pharmacy Can Supply Other Departments; and Combining Pharmacy and Purchasing Departments.

Tennessee Society

The first annual meeting of the newly formed Tennessee Society was held at the Andrew Jackson Hotel in Nashville, May 8 and 9. Dr. R. L. Crowe, dean of the School of Pharmacy, University of Tennessee, presented a paper on "The

Value of a Strong Society." The program also included a paper on "Manufacture of Parenterals" by Sister M. Franciscana, St. Joseph Hospital, Memphis and Mr. Joseph Sykes, John Gaston Hospital, Memphis. "Recent Trends in Emulsions" and "Tests for Pyrogens" were presented jointly by W. Howard Hassler, University of Tennessee and Louis Cross, graduate student in pharmacy. Mr. Ralph Stone, Vanderbilt University Hospital presented a discussion on "Our Professional Responsibilities."

Northeastern New York Society of Hospital Pharmacists.

Northeastern New York Society

Approximately 60 hospital pharmacists and guests attended the April 30 meeting of the Northeastern New York Society. The group met at Ellis Hospital in Schenectady. Included on the program was a talk on "Radioactive Pharmaceuticals" by Dr. H. M. Rozendaal, medical director, Research Division, Atomic Laboratories, General Electric, Schenectady.

New officers of the Northeastern Society include President Benjamin Teplitsky, Veterans Administration Hospital, Albany; Vice President Caryl Heeder, Albany Hospital, Albany; Secretary Annette P. Matthews, Ellis Hospital, Schenectady; and Treasurer Lucy Manvel, Leonard Hospital, Troy, New York.

Connecticut Society

The Connecticut Society of Hospital Pharmacists met on May 13 in New Haven. Dr. E. J. Foley of Winthrop-Stearns, Inc. spoke on "Alevaire." During the meeting twenty-seven certificates were issued to active and associate members. New officers installed are President David Burack, Mount Sinai Hospital, Hartford; Vice President Stephen Tyrell, Bridgeport Hospital, Bridgeport; Secretary Ruth Pully, Charlotte Hungerford Hospital, Torrington; and Treasurer Sister Maria Lucia, Hospital of Saint Raphel, New Haven.

New Associate Members of the International Pharmaceutical Federation

Adams, Ernest W., Trenton 9, N. J.
Alekna, Emily A., Pasadena 2, Calif.
Anderson, R. David, Staunton, Va.
Ball, Joseph E., Lynwood, Calif.
Barr, Gertrude, Huntington Park, Calif.
Belou, Jeanne Marie, New Orleans, La.
Bialk, Bernard A., Tucson, Ariz.
Buchman, A. G., Iron Mountain, Mich.
Butler, Wanda J., Bridgeport 4, Conn.
Cataline, Elmon L., Albuquerque, N. M.
Clason, John E., Cleveland 7, Ohio
Cobe, Herbert M., Philadelphia, Pa.
Creighton University College of Pharmacy, Omaha, Neb.
Dellande, Armand J., St. Louis 9, Mo.
Dugan, John J., New Haven, Conn.
Fiege, Robert W., Indianapolis, Ind.
Ford, C. Sherman, Rochester 20, N. Y.
Froncek, Edward J., Milwaukee, Wis.
Gibson, Arthur J., Ann Arbor, Mich.
Heaton, Amalia, Ann Arbor, Mich.
Heller, William M., Baltimore 12, Md.
Herholdt, Fred D., Dover, Del.
Inashima, Osamu James, Boston 8, Mass.
Jacobs, Sadie, Long Island, N. Y.
Jeffers, Cedric M., Temple, Tex.
Ketcham, Basil P., Philadelphia 43, Pa.
Keyzer, Cornelius, Detroit, Mich.
King, Barbara C., Vancouver, B. C., Canada
Levin, Sam D., Minneapolis 11, Minn.
Lille, Henri H., Pasadena 8, Calif.
Litman, Abe, Pittsburgh 6, Pa.
Little, Ernest, Newark 4, N. J.
Lukaszewicz, John J., Buffalo 11, N. Y.
Moir, John G., Ann Arbor, Mich.
Muroff, John M., Philadelphia 4, Pa.
Neal, Browning A., Buffalo 3, N. Y.
Nehring, Oscar S., St. Louis 7, Mo.
Perlman, Kalman I., Highland Park, Ill.
Perrignon, Suzanne, Paris 15, France
Peterson, Charles, Lawrence, Kan.
Pisa, Albert R., Detroit 27, Mich.
Powers, Justin L., Washington 7, D. C.
Pulley, Ruth, Torrington, Conn.
Ramirez, Jaime, La Ceiba, Honduras, C. A.
Reynolds, Robert J., Enid, Okla.
Ritzlin, Philip, Chicago 24, Ill.
Roth, H. D., Washington 25, D. C.
Sanchez, Charles Porta, Habana, Cuba
Schneider, Adela, Houston, Texas
Shenkarow, Louis E., Tucson, Ariz.
Sister M. Ancilla, Hamilton, Ontario, Canada
Sister M. Teresa (Bramsiepe), Oklahoma City 3, Okla.
Sister Mary Finian Bradley, Long Beach 13, Calif.
Sister Mary John, Toledo, Ohio
Skinner, Emmett H., St. Louis 8, Mo.
Steele, Frank J., Greenwich, Conn.
Steppig, Oliver J., St. Louis, Mo.
Sturmer, Francis X., Buffalo, N. Y.
Taylor, George W., Milledgeville, Ga.
Teicher, Philip, Rochester 21, N. Y.
Temple University School of Pharmacy, Philadelphia 40, Pa.
Tobin, Dorothy E., Jackson, Mich.
Tomihiro, Todd, San Jose, Calif.
Vanderlinden, Nellie, Salt Lake City, Utah
Von Stanley, Eugene, Trenton, N. J.
Wajert, Agnes P., Columbia, Mo.
Welch, E. W., Brooklyn 1, N. Y.
Whitney, Harvey A. K., Dearborn, Mich.
Yalon, Jerome M., San Francisco, Calif.
Zahalan, Francis, Montreal 18, Canada
Zimmerman, D. R., New York 22, N. Y.

as the president sees it

GROVER C. BOWLES
Strong Memorial Hospital, Rochester, N. Y.

Perhaps the following account of my travels during the past two months can best describe the activities of the president.

April 7 Arrived in New Orleans, accompanied by Mrs. Bowles for the Annual Meeting of the Southeastern Society of Hospital Pharmacists held in conjunction with the Southeastern Hospital Conference.

April 8 At a luncheon of the Georgia Hospital Pharmacists, I discussed SOCIETY activities. In the afternoon, I participated on the program of the Southeastern Hospital Conference, discussing, "Should the Hospital Pharmacist be Subjected Centralized Purchasing?" Samuel E. Redfearn, purchasing agent from Touro Infirmary, took the other side. Former hospital pharmacist D. O. McClusky was moderator.

April 9 International Hospital Pharmacy was my topic at the opening session of the Southeastern Society of Hospital Pharmacists annual meeting. I enjoyed recalling my experiences at the First International Congress on Hospital Pharmacy which was held in Basel, Switzerland last September.

April 11 On to Memphis for the week-end to visit friends, including Dean Crowe, at my Alma Mater, the University of Tennessee.

May 11 Discussed the work of the Committee on the Role of the Pharmacist in the Small Hospital with Tom Foster who was in Rochester on business.

May 13 The Second Annual Rutgers Pharmaceutical Conference was held in New Brunswick. I was there to present hospital pharmacy's view on a panel "What Members of the Pharmaceutical and Allied Health Fields Expect From Each Other." This panel was moderated by A.Ph.A. Secretary Dr. Robert P. Fischelis. Other members of the panel included Dr. Harold Murray, president of the Medical Society of New Jersey; John J. Toohy, vice president of E. R. Squibb & Sons; James E. Allen, vice president of Henry P. Gilpin Wholesale Drug Company, Washington, D. C.; and Ira I. Schwarz, president of the New Jersey Pharmaceutical Association.

May 16 En route to Atlantic City, I stopped in Washington to discuss SOCIETY affairs and our annual program with Gloria Niemeyer.

May 17 A brief meeting with Dr. Fischelis and A.Ph.A. President Dick Richards was followed by lunch at Washington's National Airport as guests of Dr. and Mrs. Fischelis before leaving for Atlantic City.

May 18-19 Participated in a discussion on Administration and Management Patterns concerning Central Supply at the Institute on Central Supply Room Administration in Atlantic City. This institute was the first of its kind to be held and was conducted jointly by the American Hospital Association and the National League for Nursing. Although this group did not favor supervision of central supply by the pharmacist, there seemed to be a general agreement that parenteral solutions are pharmaceuticals and should be prepared by the pharmacist.

May 23-25 This trip to Kansas City was to bring greetings and to take part in the program of the Fifth Catholic Hospital Association Institute for Hospital Pharmacists. The institute was again sponsored jointly by the Amercian Pharmaceutical Association, the Society, and the Catholic Hospital Association.

NEWS ITEMS

Western Hospital Association Meets

The Pharmacy Section of the Western Hospital Association met in Salt Lake City on April 27-30. Headed by Mr. Charles Hagan, chief pharmacist at Santa Monica Hospital in Santa Monica, Calif., the group discussed the advantages of forming a Society in Salt Lake City. Mr. Chase Holaday, chief pharmacist at Herrick Memorial Hospital in Berkley, California, presented a paper on "Value of Hospital Pharmacists' Organization —American Society of Hospital Pharmacists and American Pharmaceutical Association." Other speakers included Mr. Leroy R. Bruce, director, Los Angeles County Hospital, who discussed "Administration and Pharmacy Relations;" Mr. F. H. Thistlethwaite, manager, Hospital Sales Division, Parke, Davis and Co.; Mr. E. R. Coar, Abbott Laboratories who spoke on "Use of Radioactive Isotopes in Medicine." Mr. Claude Busick, chief pharmacist at St. Joseph Hospital, Stockton, Calif., reported on his trip to the International Congress for Hospital Pharmacists held in Basle, Switzerland, in September, 1952.

Sister Mary Junilla, chief pharmacist at Queen of Angels Hospital in Los Angeles, and a past treasurer of the ASHP, played an active role in the meetings of the Western Hospital Association. As retiring president, she presided over a session dealing with current trends in nursing teams and personnel.

Hospital Pharmacists Speak

"The Pharmacy in Your Hospital" was the subject covered at the May 14 meeting of the Association of Delaware Hospitals held at Beebe Hospital, Lewes, Del. Mr. Herbert Flack, chief pharmacist at the Jefferson Medical College Hospital in Philadelphia and Mr. Robert Cathcart, chief pharmacist at the Delaware Hospital in Wilmington, Del. were the speakers.

New England Hospital Assembly

Hospital pharmacists from Connecticut, Rhode Island and Massachusetts participated in the New England Hospital Assembly held in Boston on March 24. Mr. Francis J. Sullivan, chief pharmacist at the Grace-New Haven Community Hospital in New Haven spoke on "Acquisition of Supplies in the Pharmacy;" and Miss Ruth Pully, chief pharmacist at the Charlotte Hungerford Hospital in Torrington, Conn., discussed the new interpretations of the Federal Narcotic regulations as presented by the ASHP Committee. Other papers included "Management of the Central Sterile Supply" by Dr. William Hassan, chief pharmacist at Peter Bent Brigham Hospital in Boston; "Management of the Pharmacy in the Small Hospital" by Robert Daigle, chief pharmacist, State Sanatorium, Wallum Lake, R. I.; "Professional Relationships of the Pharmacy with Special Reference to the Medical Staff" by O. J. Bizzozero, M.D., Waterbury Hospital, Waterbury, Conn.; and "Professional Relationships of the Pharmacist with Special Emphasis on Nursing" by Edmund Singer, chief pharmacist, Norwalk Hospital, Norwalk, Conn.

Tri-State Assembly

Mr. Paul Parker, chief pharmacist at the University of Chicago Clinics was elected chairman of the Pharmacy Section of the Tri-State Hospital Assembly meeting in Chicago on May 4, 5 and 6. Elected secretary was Mr. Leo Godley, chief pharmacist at Bronson Methodist Hospital, Kalamazoo, Michigan. The Tri-State Hospital Assembly representing Michigan, Illinois, Indiana and Wisconsin, meets annually in Chicago early in May.

Muldoon Receives Remington Medal

Hugh C. Muldoon, dean of the School of Pharmacy, Duquesne University, Pittsburgh, Pa. has been named recipient of the 1953 Remington Medal, pharmacy's highest award. Dean Muldoon is well known to hospital pharmacists, many of whom have received training at Duquesne University where he has been dean since the school was founded in 1925. He has been active in the A.Ph.A. for many years and has served on numerous committees, as chairman of the House of Delegates and in 1949 he was a member of the A.Ph.A. Mission to Japan. Dean Muldoon has written textbooks on organic chemistry and pharmaceutical Latin and he edits *The Science Counselor*. In 1952 he served as chairman of the A.Ph.A.'s Centennial Committee.

The Remington Award was established by the New York Branch of the American Pharmaceutical Association in 1918 to be given annually to the individual who has done most for American Pharmacy in the previous year, or whose con-

tinuing contributions to the advancement of the profession have been outstanding. The past presidents of the A.Ph.A. serve as the jury of award.

Consultant to Hospital Bureau

Mr. Robert Bogash, chief pharmacist at the Lenox Hill Hospital in New York City has been appointed a consultant to the Committee on Drugs and Pharmaceuticals of the Hospital Bureau of Standards and Supplies, Inc., New York City. Another member of the Committee is Mr. Vincent Conti, pharmacist at the Hospital for Special Surgery, New York City.

Hospital Pharmacists Elected

Victor G. Canaipi, chief pharmacist at The Memorial Hospital in Pawtucket, Rhode Island, has been elected president of the Rhode Island Pharmaceutical Association. Mr. Canaipi has been active in the ASHP for a number of years.

Two former hospital pharmacists have been elected officers of the Alabama Hospital Association—D. O. McClusky, administrator of Druid City Hospital, Tuscaloosa, is vice-president and Mr. C. Joseph Vance, administrator at South Highlands Infirmary, Birmingham, is president-elect. Both men have been active in the Southeastern Society of Hospital Pharmacists and have served on committees of the ASHP.

Mr. Louis Gdalman, St. Luke's Hospital, Chicago, has been elected president of the Chicago Branch of the American Pharmaceutical Association. Mr. Gdalman is a charter member of the ASHP and has served as secretary of the Illinois Chapter for several years.

Gamma Globulin Distribution

With announcement of the use of gamma globulin in the prevention of poliomyelitis, pharmacists as well as others in the health field have been concerned with supply and distribution. Details of the procedure for handling distribution through health officers of the various states has been outlined in the April issue of the *J. Am. Pharm. Assoc., Pract. Pharm. Ed.* Although this is being handled directly with physicians and they are requested to give complete information on cases for which gamma globulin is requested, it is probable that hospital pharmacists will have some inquiries concerning supply and distribution.

Only **POUR-O-VAC SEALS**

afford a practical means of avoiding a wasteful, inconvenient, time-consuming and questionably scientific method of sealing and handling your supply of surgical solutions ... and routinely checking the sterility of contents during long storage periods without breaking the hermetic seal.

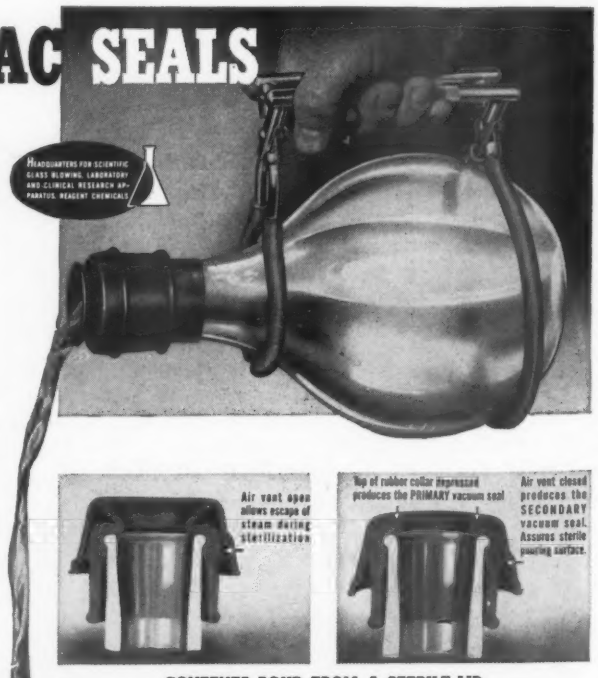
... and with it goes

1. **Supply Conservation** ... provides dustproof seal for remaining fluid when only partial contents of a container are used.
2. **Supply Conservation** ... eliminates need to utilize gauze, cotton, paper, string or tape to effect makeshift seal of questionable efficiency.
3. **Supply Conservation** ... reduces possibility of breakage or chipping damage to lips of Fenwal containers.
4. **Supply Conservation** ... POUR-O-VAC SEALS* are reusable ... may be sterilized repeatedly ... interchangeable for use with 500, 1000, 1500, 2000, 3000 ml. FENWAL containers.

*A product of Fenwal Laboratories, Inc.

ORDER TODAY or write us for detailed information

MACALASTER BICKNELL PARENTERAL CORP.
243 Broadway Cambridge 39, Massachusetts


Air vent open allows escape of steam during sterilization
Top of rubber collar depressed produces the PRIMARY vacuum seal
Air vent closed produces the SECONDARY vacuum seal. Assures sterile pouring surface.

CONTENTS POUR FROM A STERILE LIP

THE SOLUTION DESIRED — THE Fenwal SYSTEM — AT THE INSTANT REQUIRED

The Office of Defense Mobilization, in which is vested responsibility for the National Blood Program, has delegated to the Department of Health, Education and Welfare, the responsibility for distribution of gamma globulin. This is being administered by the Public Health Service in accordance with policies established by the Office of Defense Mobilization. The National Research Council provided assistance in the development of the allocation plan.

Under the over-all coordination of the Surgeon General's office, the specific allocation and distribution operations, are carried out by the Division of Civilian Health Requirements. The two persons handling the distribution and epidemiological functions, respectively, are J. Solon Mordell, Senior Pharmacist, Public Health Service, and Dr. Ralph Paffenbarger, Jr., Surgeon, Public Health Service, epidemiologist.

Bowles Represents Hospital Pharmacists

Grover C. Bowles, president of the ASHP, participated in a panel on "What Members of the Pharmaceutical and Allied Health Fields Expect from Each Other" at the second annual Rutgers Pharmaceutical Conference held at Rutgers University on May 13. Mr. Bowles spoke from the viewpoint of the hospital pharmacist with other participants presenting the viewpoints of the physician, pharmaceutical industry, the drug wholesaler and the retail pharmacist. The discussion was moderated by Dr. Robert P. Fischelis, secretary of the American Pharmaceutical Association.

Dr. Cadmus Speaks

Graduate of Rutgers University's first Hospital Pharmacy Workshop received certificates at a dinner on Tuesday, June 2, at Military Park Hotel. The workshop was given by Rutgers College of Pharmacy in conjunction with the New Jersey Society of Hospital Pharmacists.

Dr. Robert Cadmus, director of the North Carolina Memorial Hospital, addressed the group on "The Administrator Looks at the Hospital Pharmacist." Dr. Cadmus, a graduate of Columbia University's College of Physicians and Surgeons, has been chairman of the American Hospital Association's Committee on Pharmacy since 1949. He is also presently a member of the Policy Committee of the A.Ph.A. and ASHP.

EDIOL
Trademark

[ORAL FAT EMULSION SCHENLEY]

• **provides extra calories**—150 per ounce, in easily utilized form, for quick gain in weight and strength

• **without excessive bulk**—no undue digestive burden...no reduction in appetite for other foods

• **or cloying taste**—delicious alone or with a variety of nutritious foods

In 16-oz. bottles.

SCHENLEY LABORATORIES, INC.
LAWRENCEBURG, INDIANA

schenley

© Schenley Laboratories, Inc.

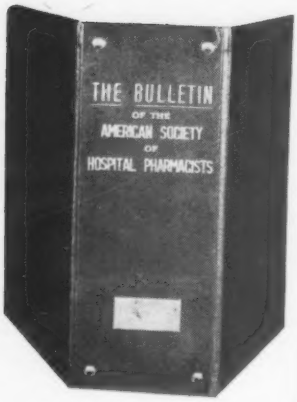
PERMANENT BINDER

FOR

The BULLETIN

of the

A.S.H.P.



$3.00 POSTPAID

4 or more $2.50 each

Purchase price refunded if not completely satisfied.

This new custom made binder is now large enough to contain the Decennial issue in addition to the new larger editions of THE BULLETIN. It is made of heavy ¼ inch cardboard, covered with waterproofed red leather reproduction, with the name die stamped in gold on the side with a special marking block provided to date the editions in the binder. It is manufactured to hold all the editions of THE BULLETIN issued during a two year period (12 issues). This binder has the approval of the publications committee of the A.S.H.P.

P. O. BOX 5544
BINDER-A.S.H.P.
FRIENDSHIP STATION
WASHINGTON 16, D.C.

I enclose $_____ for ____ binder(s) which you will send postpaid.

NAME_____

STREET_____

CITY_____ ZONE____

STATE_____

New Organizations Planned

Plans are underway to organize several new chapters of the AMERICAN SOCIETY OF HOSPITAL PHARMACISTS. Among these is a group in Utah headed by Mr. D. Wallace Thorup, chief pharmacist at the Salt Lake General Hospital, Salt Lake City. Also recently organized is the South Carolina Society which has elected as its first president, Miss Miriam Durham, chief pharmacist at Tuomey Hospital, Sumter, S. C. Tentative plans have been made by the Houston Area Society of Hospital Pharmacists to affiliate with the national organization.

S. C. Society Organizes Council

The Southern California Society of Hospital Pharmacists has organized a group of its members into a council for the assistance of hospital pharmacists and hospital administrators in their various pharmacy department problems. Their service is to be voluntary, without charge and the objective is to assist whenever requested, in adjustment of difficulties that may arise in this field.

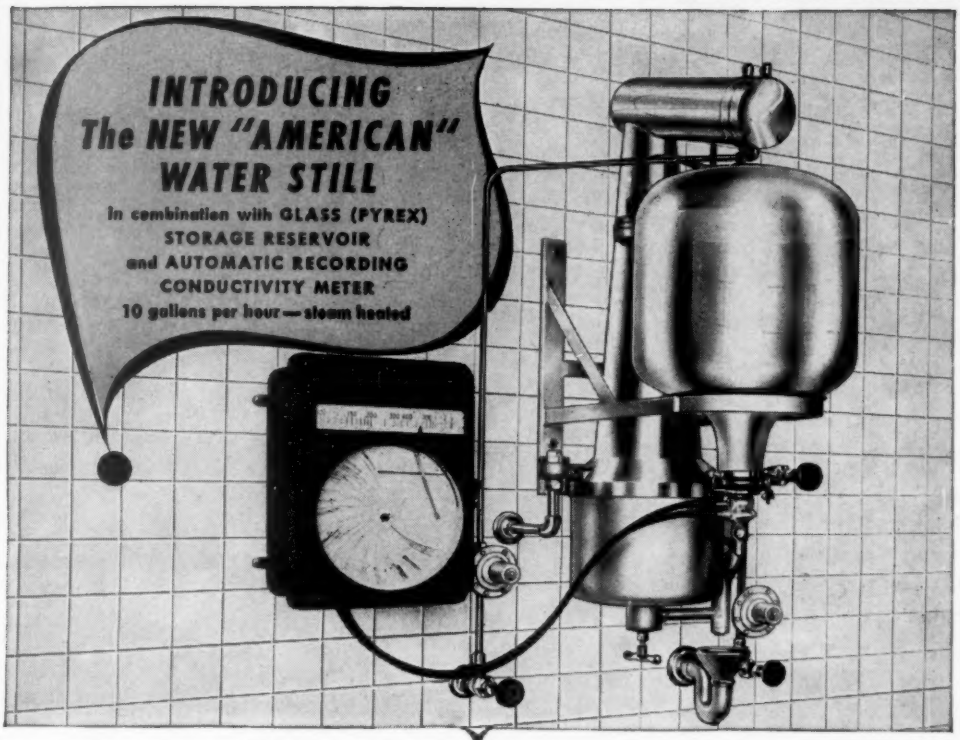
The duties of this committee will be entirely in an advisory capacity. Policies are formulated to assist in coordinating this service. The secretary will refer small problems to the committee member or members with whom the problem is most closely associated. Larger problems will be solved at group meetings. Emergency and small matters will be conducted by telephone. If necessary the committee will meet personally with the person or persons referring the subject.

Problems may be in the field of personnel, purchasing, information concerning drugs and drug news, manufacturing formulae and equipment, sterile solutions, formularies, therapeutic or drug committees, narcotic problems and State Board of Pharmacy relations. Building, alterations, planning and fixture installations are included.

Members of this committee are: Chairman Charles G. Towne, president Southern California Society Hospital Pharmacists; Sister Mary Junilla, F.A.C.A., first president of the Southern California Society, Walter Hitzelberger, past president; and Secretary Norma Irish.

A.H.A. Convention

The 1953 Convention of the American Hospital Association will be held in San Francisco, Calif. August 31-September 3. The Northern California Society of Hospital Pharmacists will cooperate with the American Pharmaceutical Association in sponsoring an exhibit.



Exclusive Features

- Automatic removal of released gases from condenser.
- Easy cleaning of evaporating pan and steam coil without use of tools. (Within easy reach of operator).
- Continuous check on purity of distillate by automatic recording conductivity meter—cell located in outlet of storage bottle.
- 30-inch rise (vapor tower) between water level in evaporating pan and condenser.
- Designed for all applications requiring high purity pyrogen-free distilled water.

ANALYSIS OF DISTILLED WATER FROM ASPF STILL

Pyrogens (U.S.P. Test)	Negative
pH	6.0
Resistance (Specific Ohms)	1,200,000
Inorganic solids (After standing 24 hours in pyrex container)	0.2 p.p.m.
Chlorides	Nil
Iron	0.001 p.p.m.
Copper	0.004 p.p.m.
Nickel	0.010 p.p.m.
Lead	0.001 p.p.m.
Calcium	0.045 p.p.m.
Silicon	0.078 p.p.m.
Nitrate	0.015 p.p.m.
Nitrite	0.001 p.p.m.
Zinc	Negative
Tin	Negative
Magnesium	Negative
Sulfate	Negative

RAW WATER SUPPLY TO STILL

Total non-volatile at 105° C	198. p.p.m.
Total hardness as $CaCO_3$	130. p.p.m.
Bicarbonate hardness	91. p.p.m.
Chlorine	28. p.p.m.

For information on the ASPF (pyrogen-free) technique for Hospital-made liquids, write Dept. ST-5.

AMERICAN STERILIZER COMPANY
ERIE • PENNSYLVANIA

AMERICAN STERILIZER
PYROGEN FREE
ASPF
technique
FOR HOSPITAL-MADE LIQUIDS

NEW MEMBERS

MAY 1, 1953

ARIZONA

Anderson, Yvonne M., 338 E. Portland, Phoenix

CALIFORNIA

Calnon, Alice, 1419 N. Ave. 48, Los Angeles
Cranford, A. Lamont G., 2837 S. Bronson Ave., Los Angeles
Hill, Wendell T. Jr., Wadsworth Hospital, Los Angeles
Matsumoto, Kazuko, 2032 Baltic Ave., Long Beach
Sakai, Yaeno, 1136½ S. Normandie Ave., Los Angeles

COLORADO

Drommond, Fred G., College of Pharm., Univ. of Colo., Boulder (A)

CONNECTICUT

Haury, Otto D. Jr., 109 Rowsley St., Bridgeport

DELAWARE

Marvel, John R., 2511 Market St., Wilmington

DISTRICT OF COLUMBIA

Ruppenthal, Edna T., 2650 Wisconsin Ave., N. W., Washington

GEORGIA

Hartman, Charles W., Box 226, Ag. Hill, Athens (A)

ILLINOIS

Eaton, Olyn E., 318 W. Walnut St., Carbondale

INDIANA

Kahler, Constance J., St. Joseph Memorial Hospital, Kokomo

MAINE

Sister Guy Lebrun, 318 Sabattus St., Lewiston (A)

MARYLAND

Browne, Robert T., 2716 N. Calvert St., Baltimore
Provenza, Stephen J., 109 E. Montgomery St., Baltimore (A)

MASSACHUSETTS

Arrigo, Pasquale A., 21 Conwell St., Somerville
Lezberg, Thelma C., 205 Bonad Rd., Chestnut Hill
Marini, Reno B., 92 Quincy St., Quincy
Perina, Anthony J. Jr., Main St., R.F.D., Townsend

MICHIGAN

Hester, John W., 100 S. Forest Ave., Ann Arbor
Hulun, Virginia, 3246 W. Euclid, Detroit
McConnell, Warren E., 1336 Wilmot, Ann Arbor (A)
Melcher, Donald E., 21751 Beech, Dearborn

NEW HAMPSHIRE

Pressey, Raymond H., 24 Spring St., Lebanon

NEW JERSEY

Lopyan, Herman R., 3315 Pleasant Ave., Union City
Mannino, Alfred A., 515 First St., Westfield (A)
Nisselson, Hyman, 94 S. Harrison St., East Orange

NEW YORK

Doyle, Janet E., Columbia Memorial Hospital, Hudson
Grajales, C. Yolanda, 910 Jennings St., Bronx
Hinton, Edward F., 313 Church, Newark
Jacobs, Warren H., V. A. Hospital Grounds, Canandaigua
Levy, Jacob, U.S.P.H.S. Hospital, Staten Island
Schifano, Paul J., 60 Rossiter Rd., Rochester
Sister Mary Virginia, No. Village Ave., Rockville Centre

OKLAHOMA

Self, Jerry J., Community Hospital, Elk City

OREGON

Manes, Robert S., 7658 N. Wabash Ave., Portland

PENNSYLVANIA

DeLuca, Carmine T., Old Lancaster Rd., Berwyn (A)
Goldman, Harry A., 5723 N. 12th St., Philadelphia
Hertzler, Aldus K., Abington Memorial Hospital, Abington
Wolinsky, George, Thomas Drug Store, 2 N. Pennsylvania Ave., Greensburg

SOUTH CAROLINA

Gallogly, E. F., 1011 Kalmia St., Florence

TENNESSEE

Whaley, Marian, 4159 Given Ave., Memphis

VIRGINIA

Marchek, Carlyle S., 2906 S. Buchanan St., Arlington (A)
Pringle, Howard A., Rte. 2, Herndon

WASHINGTON

Brady, Dessie M., Rte. 1, Sunnyside

CANADA

Takenaka, Phyllis S., 68 Sussex Ave., Toronto, Ont.

CANAL ZONE

Webb, Winton A., Box 1415, Balboa

GUATEMALA

Escaler P., Eugenio, 6a Calle Ciudad Vieja Nr. 5, Guatemala

Graduate Study in Hospital Pharmacy

Two schools have recently announced inauguration of graduate courses in hospital pharmacy. The University of Southern California is offering the academic work in night school so that an internship in hospital pharmacy may be filled at the same time. For details, inquire at the University of Southern California School of Pharmacy, Los Angeles 7, Calif.

The College of Pharmacy and the Graduate College of the University of Nebraska will offer a combined program in cooperation with the Lincoln General Hospital and Bryan Memorial Hospital. Applications for admission should be sent to Dr. R. W. Goss, dean of the Graduate College, University of Nebraska.

New

LACTINEX
TABLETS

For gastrointestinal disturbances, particularly diarrhea, including those resulting from antibiotic therapy.

'Lactinex' Tablets contain a standardized viable mixed culture of Lactobacilli acidophilus and bulgaricus.

'Lactinex' Tablets are highly effective in re-establishing normal physiology in gastrointestinal disturbances when prescribed in dosages of 2 to 4 tablets three or four times a day with at least one half glass of milk.

Supplied in bottles of fifty tablets.

HWD

HYNSON, WESTCOTT & DUNNING, INC., Baltimore 1, Maryland

POSITIONS

IN HOSPITAL PHARMACY

POSITIONS OPEN

MICHIGAN—immediate opening for assistant chief pharmacist. Woman preferred. Salary plus full maintenance. Send applications to Miss Dorothy E. Tobin, W. A. Foote Memorial Hospital, Jackson, Mich.

ILLINOIS—Staff pharmacist for 337-bed general hospital in pleasant lake-shore suburb. Must be registered or eligible for registry; 40-hour week, one month vacation. Sick leave, insurance and other employee benfits. Salary depends on training and experience. Apply Personnel Director, Evanston Hospital, 2650 Ridge Avenue, Evantson, Ill.

STAFF PHARMACIST—400-bed university hospital, Washington, D. C. Prefer man with hospital experience or one-year internship. Salary commensurate with training and experience; 44-hour week with three weeks paid vacation. Contact Division of Hospital Pharmacy, 2215 Constitution Ave., N. W., Washington 7, D. C. for further information. (PO-5)

WANTED—Pharmacist to organize Department of Pharmacy at The Methodist Hospital of Kentucky, Pikeville, Kentucky. The hospital has 150 beds. Starting salary $4200 per year with increase to $4800 at end of six months. Please write to Administrator, Methodist Hospital of Kentucky, Pikeville, Kentucky.

The following openings in hospital pharmacy appeared in current issues of hospital publications. Anyone interested in the positions should write directly to the Agency indicated. A fee is charged when positions are secured through the services of a personnel agency.

PHARMACISTS—(a) Middle West. 160 bed general hospital, active department; serve hospital patients only. $5000. (b) East. 350 bed general hospital in city of 200,000. $4800. (c) Chief. East. 400 bed general hospital in city of 125,000. Complete modern facilities. $5000 minimum. (d) Middle West, 150 bed hospital in city of 500,000. $4800. Shay Medical Agency, 55 E. Washington St., Suite 1935, Chicago 2, Ill.

Advertisers

May - June 1953

American Sterilizer Company
ASPF Technique, 245

Ames Company
Decholin, 170

Armour Laboratories
Tryptar, 172

Bristol Laboratories
Flo-Cillin Aqueous-DS, 181

Ciba Pharmaceutical Products, Inc.
Nupercainal Ointment, outside back cover

Cutter Laboratories
Polysal, 178

Eli Lilly and Co.
Multicebrin, inside front cover

E. Fougera & Company, inside front cover
Efocaine, 179

Geigy Pharmaceuticals
Eurax Cream, 171

Hoffmann-La Roche Inc.
Levo Dromoran, 188

Hynson, Westcott & Dunning, Inc.
Lactinex Tablets,

Lakeside Laboratories
Neohydrin, 176

Lederle Laboratories
Liver Extracts, 187

Macalaster Bicknell Company
Pour-O-Vac Seals, 242

Mallinckrodt Chemical Works
Ether for Anesthesia, 182

Merck & Co., Inc.
Hydro Cortone, 184

Miles Laboratories, Inc.
Bactine, 177

Ortho Pharmaceutical Corporation
Diffusin, 185

Parke, Davis & Company
Thrombin Topical, 190

Chas. Pfizer and Company
Steraject, 186

Schenley Laboratories, Inc.
Ediol, 243

Schering Corporation
Cortogen, 175

E. R. Squibb and Sons
Trigesic, inside back cover

Upjohn Company
Plazmoid, 173

Winthrop-Stearns, Inc.
Telepaque, 183
Zephiran, 180

Wyeth
Bicillin, 174